(1)

STRUCTURED ANALYSIS/DESIGN

LSA TASK 303
EVALUATION OF ALTERNATIVES AND TRADE-OFF ANALYSIS

SUBTASK 303.2.9
COMPARATIVE EVALUATION

APJ 966-250

APJ

MILITARY & SCIENTIFIC RESEARCH

AMERICAN POWER JET CO. RIDGEFIELD N.J.

APJ 966-250

STRUCTURED ANALYSIS/DESIGN

LSA TASK 303

EVALUATION OF ALTERNATIVES AND TRADE-OFF ANALYSIS

SUBTASK 303.2.9

COMPARATIVE EVALUATION

under

CONTRACT DAAA21-86-D-0025

for

HQ US AMCCOM

INTEGRATED LOGISTIC SUPPORT OFFICE
AMSMC-LSP
ROCK ISLAND, IL

by

AMERICAN POWER JET COMPANY

RIDGEFIELD, NJ ST. LOUIS, MO

WILLIAMSBURG, VA ARLINGTON, VA

January 1991

FOREWORD

APJ, under contract to HQs, AMCCOM, has initiated the automation of the LSA Tasks (MIL-STD-1388-1) and the assessment of the ILS elements (AR 700-127). A major goal is to unify military and contractor approach to the performance of ILS and LSA.

Detailed to meet all requirements of ILS and LSA, the automated process will continue to provide the flexibility in selecting tasks and elements to be addressed at each life cycle stage. A major advantage of this approach is to insure that the application of each task element is consistent with prescribed Army policies and procedures.

This report consolidates the Structured Analysis and Structured Design under one cover for the respective LSA Task. Structured Analysis provides a logical model of the method to perform an LSA Task. This logical model facilitates the development of a Structured Design that provides the detailed procedures to perform the analysis. Both the logical model and detailed procedures are used to develop the application software programs which will be provided to Government and contractor personnel to assist in the performance of the LSA Task.

Included in this report are the Data Flow Diagrams (DFDs) for LSA Subtask 303.2.9, "Comparative Evaluations" and the corresponding descriptions of the processes, data flows, data stores, and external entities identified on each DFD (Annex B). In addition the DFDs are further developed into step by step procedures (Annex C) which identifies how to use the data to carry out the processes which ultimately leads to accomplishing the LSA Subtask.

To assist managers in planning and controlling this task, Venture Evaluation Review Technique (VERT) Batch Input files are provided (Annex D). These VERT tools provide government agencies with complete packages to give contractors that cover both technical and managerial aspects of a task. This approach establishes a standardized form of communication and management between contractors performing the task and government personnel reviewing the task.

To view this work in context, this report also presents a brief overview of Structured Analysis and its place in the overall systems development process. Additionally, Annex E provides a brief working description of Structured Systems Analysis fundamentals. The overview and certain portions of the introductory text are repeated verbatim in every report in this series so that each report is free standing.

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

Form Approved OMB No. 0704-0188

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION / AVAILABILITY OF REPORT
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE	UNLIMITED
4. PERFORMING ORGANIZATION REPORT NUMBER(S)	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION AMCCOM, Army 6b. OFFICE SYMBOL (If applicable) AMSMC-MAE-EA	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS (City, State, and ZIP Code) Rock Island Arsenal Rock Island, IL 61299-6000	7b. ADDRESS (City, State, and ZIP Code)
8a. NAME OF FUNDING / SPONSORING ORGANIZATION 8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (City, State, and ZIP Code)	10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO. / PROJECT NO. / TASK NO. / WORK UNIT ACCESSION NO.

11. TITLE (Include Security Classification) Structured Analysis and Structured Design for the Logistic Support Analysis (LSA) Tasks, LSA Subtask 303.2.9, "Comparative Evaluations", (APJ 966-250).

12. PERSONAL AUTHOR(S)
DUCLOS, RONALD SHEPHERD, NED kmk

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
FINAL	FROM _____ TO _____	Jan 1991	81

16. SUPPLEMENTARY NOTATION

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	STRUCTURED ANALYSIS, STRUCTURED DESIGN, LOGISTIC SUPPORT ANALYSIS, LSA, DATA FLOW DIAGRAMS, DFDs, PROCESSES, DATA FLOWS, DATA STORES, EXTERNAL over

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

This report consolidates the Structured Analysis and Structured Design for the Logistic Support Analysis (LSA) Tasks. Included are the Data Flow Diagrams (DFDs) for the LSA Subtask 303.2.9, "Comparative Evaluations", with the corresponding descriptions of the processes, data flows, data stores, and external entities identified on each DFD. The DFDs are further developed into procedures which identifies how to use the data to carry out the processes and accomplish the LSA Subtask. Venture Evaluation Review Technique (VERT) Batch Input files are also provided to assist, as tools, giving both technical and managerial aspects of a task.

20. DISTRIBUTION / AVAILABILITY OF ABSTRACT ☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS	21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED
22a. NAME OF RESPONSIBLE INDIVIDUAL NED SHEPHERD	22b. TELEPHONE (Include Area Code) (309) 782-2479 22c. OFFICE SYMBOL AMSMC-MAE-EA

DD Form 1473, JUN 86 *Previous editions are obsolete.* SECURITY CLASSIFICATION OF THIS PAGE

18. SUBJECT TERMS - continued:
ENTITIES, PROCEDURES, VENTURE\EVALUATION REVIEW TECHNIQUE, VERT, PROCESS FLOWS, OVERALL SYSTEMS DEVELOPMENT PROCESS, STRUCTURED SYSTEMS ANALYSIS FUNDAMENTALS, AND COMPARATIVE EVALUATIONS.

EXECUTIVE SUMMARY

LSA SUBTASK 303.2.9
COMPARATIVE EVALUATION

The American Power Jet Company (APJ) is under contract to the Army Armament Munitions and Chemical Command (AMCCOM) to provide "how to" procedures for selected ILS and LSA tasks. Accordingly, this effort requires the formalization of processes which are frequently ill defined and produce diverse and varied outputs. The results of this effort are a series of Structured System Analysis and Structured System Design reports which set forth a generic approach to each task which may be tailored to specific weapon system characteristics and life cycle stage.

The intent of this work is to be compatible with CALS, LOGPARS, and other similar efforts to enhance performance, training, and automation, Our basic structure facilitates the downstream application of Artificial Intelligence and streamlining of these critical functions.

STRUCTURED SYSTEM ANALYSIS

Excelerator, a Computer Aided Software Engineering (CASE) tool, was used to prepare the Structured System Analysis. Each LSA Task is modeled by a series of Data Flow Diagrams (DFDs), depicting activities and accompanying data flows needed to produce intermediate or final products. Complex activities are "broken down" or "exploded" into lower level data flow diagrams.

Each DFD can contain four types of objects:

- **Processes** or activities
- **Data Flows** - inputs to a process or data output generated from a process
- **Data Stores** - identifies sources for the data
- **External Entities** - indicates who to contact for guidance.

Each object is described either by developing detailed procedures or identifying its data content. The object descriptions are placed in a Data Dictionary which is built-up as the Data Flow Diagrams are expanded, detailed, and eventually completed.

STRUCTURED SYSTEM DESIGN

The Structured Design amplifies the processes and data flows developed in the Structured Analysis into procedures used to accomplish the LSA Tasks and Subtasks. The Analysis provides the method and the Design implements it.

In addition to the narrative portions of the structured Design, "Input Screens" are developed for each process or set of processes. The charts structure and organize the data needed to perform a LSA task and make decisions on Weapon System supportability. By formalizing the data requirements in this manner, a standard set of output reports can be specified.

AUTOMATION

The Structured Design material can of course be used in a manual fashion. However, automation of the task achieves several objectives:

The analyst performing the LSA Task is taken through a series of automated steps leading to a successful result. Help is available at every step to guide the analyst through the task.

Information is organized, so that productivity improves because more time is spent gathering, analyzing, and interpreting the data instead of tedious record keeping. This structure allows the data to be easily retrieved, edited, and added to.

Output reports are standardized through a report generation facility using preprogrammed report formats.

A significant volume of data will be captured and stored over a period of time, creating a large "knowledge base". This knowledge base provides a body of procedures, sources, data, and lessons learned for an analyst to query and apply against a new or update analysis effort. This available information forms the ob basis an Artificial Intelligence (AI) expert system.

Automation of selected LSA subtasks is being prototyped to demonstrate the principles involved and gain user experience. Although fully general, all prototypes are designed for ready development and adaptation to specific weapon systems.

LSA SUBTASK 303.2.9 - DESCRIPTION

To place this LSA Subtask in context, it is one of 13 Subtasks of LSA Task 303, "Evaluation of Alternative and Trade-Off Analysis", and is used to examine the growth in supportability, cost, and readiness parameters over existing systems. The input for this subtask comes from LSA Tasks 201, 203, and 301.

LSA Subtask 303.2.9 is accomplished by first identifying the baseline existing systems. Next, two parallel paths are taken to analyze the supportability, cost and readiness parameter for both the new system and the existing systems. Using the results of the analysis, the impact of introducing the new system on the existing IS structure is examined.

The parallel paths are brought together for analysis of the growth risk. VERT is recommended as a method for analyzing the risk. Finally, all the factors of the subtask are brought together to do a trade-off analysis. The trade-off analysis consider, from a logistics viewpoint, if an existing system can successfully fill the role of the intended new system.

The output of the subtask, is used to support or complete the decisions made in related 303 Subtasks.

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LIST OF FIGURES

INTRODUCTION

PURPOSE

The purpose of this report series is to present the results of the APJ Structured Analysis/Design under Contract DAAA21-86-D-0025 for coordination with the AMCCOM Program Manager prior to in-depth programming of ILS and LSA functions and processes. LSA Task 303 "Evaluation of Alternatives and Trade-Off Analysis", (LSA SUBTASK 303.2.9 "Comparative Evaluations") is addressed in this report.

BACKGROUND

The Department of the Army has a requirement for management control over contractor and Government agency response to the requirements of AR 700-127, "Integrated Logistic Support", and MIL-STD-1388-1, "Logistic Support Analysis". HQs AMCCOM has initiated action to structure each of the LSA tasks, the assessment of each ILS element, the form of the results, and the detailed processes to insure consistency with current Army policies, procedures, and techniques.

This approach (undertaken by AMCCOM and APJ) will insure uniformity in efforts and products, reproducibility of analyses, and a well-defined structure which can be coordinated among all participants in the logistic process to arrive at common understanding and procedures.

SCOPE

This report summarizes the results of the Structured Analysis of the identification of LSA Task 303 "Evaluation of Alternatives and Trade-Off Analysis", LSA Subtask 303.2.9, "Comparative Evaluation", and presents the associated Data Flow Diagrams (DFDs) developed from the Structured Analysis and the corresponding procedures developed in the Structured Design. The portions of the Data Dictionary relating to the DFDs for this LSA Subtask includes the labels, names, descriptions, processes, data flows, data stores, and external entities. (The Data Dictionary is a "living document" that evolves through the analysis and design process).

The Data Dictionaries developed for each of the individual LSA Subtasks are integrated together into a Master Data Dictionary. Integration of the individual Data Dictionary involves the combination of similar Data Flows, Data Stores, and External Entities. The resulting Master Data Dictionary may well contain some minor differences from the definitions that appear in this report. All processes, and of course, the content of the structured design will remain identical.

The Structured Design portion of this report develops the processes and data flows developed in the DFDs into procedures which are used to accomplish the LSA Tasks. The DFDs provide the method and the Design implements it, by formulating a guide for programmers to write software applications.

This report presents a brief overview of Structured Analysis and its place in the overall systems design process to assist the reader who may not be fully briefed on the symbols and conventions used. It is supported by Annex E, which defines each element in Structured Analysis.

LSA SUBTASK 303.2.9 - DESCRIPTION

LSA Subtask 303.2.9 examines the growth in supportability, cost, and readiness parameters of a new system being developed over existing similar systems. This task is accomplished by first identifying the comparative existing systems. Next, two parallel paths are taken to analyze the supportability, cost and readiness parameter for both the new system and the existing systems. Using the results of the analysis, the impact of introducing the new system on the existing ILS structure is examined.

The parallel paths are brought together for analysis of the growth risk. VERT is recommended as a method for analyzing the risk. Finally, all the factors of the subtask are brought together to do a trade-off analysis. The trade-off analysis consider, from a logistics viewpoint, if an existing system can successfully fill the role of the intended new system.

The LSA Task Description with associated task inputs and outputs is extracted from MIL-STD-1388-1A and is included as Annex A.

APPROACH

The APJ approach to Structured Analysis and Structure Design of an LSA Subtask is:

1. Scope the Subtask defined in MIL-STD-1388-1A with the overall task and determine its relationship with other LSA Tasks.

2. Review all pertinent documentation (e.g., AR's, MIL-STDs, etc.) applicable to the specific topic.

3. Prepare the Top Level DFDs in context of the Subtask, and develop lower level DFDs to further quantity any complex process identified in the top level DFD.

4. Complete the Data Dictionary portion of the Analysis by descripting all processes, data flows, data stores and external entities.

5. Apply staff experience in logistic support analysis to assure that the topic has been exhaustively addressed.

6. From the completed DFDs prepare the step by step procedures that form the structured design.

7. Review Data Item Description and other applicable material to develop output reports.

8. If required revise DFDs and Data Dictionary based on preparation of detailed procedures.

9. Validate results in discussions with Army activities and personnel directly involved in the applicable or related LSA tasks.

NOTE: Structured Analysis and preparation of Data Flow Diagrams (DFDs) was further assisted by the application of Structured Analysis software. Licensed by Index Technology Corporation, Excelerator provides for automated tracking of names, labels, descriptions, multiple levels of detail in the data flow diagrams, and industry standards in symbols and diagramming practices.

LSA SUBTASK 303.2.9 - COMPARATIVE EVALUATIONS

The Data Flow Diagram is a tool that shows the flow of data, (i.e., data flows from sources) and is processed by activities to produce intermediate or final products.

The DFD provides a useful and meaningful partitioning of a system from the viewpoint of identification and separation of all functions, actions, or processes so that each can be introduced, changed, added, or deleted with minimal disruption of the overall program, i.e., it emphasizes the underlying concept of modularity and identifiable transformations of data into actionable products.

A series of three (3) DFDs have been developed to structure the LSA subtask relative to operations and other support functions:

1. 303.2.9 Top Level
2. 303.2.9.2A Identify Parameters of New System/ Equipment
3. 303.2.9.3A Identify Parameters of Existing System/ Equipment

Each DFD is keyed to the specific task through the identification number assigned in the lower right hand box. The Alpha codes indicate the level of indenture or explosion below the top level, i.e.,:

Top Level.....LSA DFD 303.2.9
First Indenture.....LSA DFD 303.2.9.2A

Each DFD makes reference to the basic LSA task it addresses, as well as the level of indenture (explosion) of the DFD. For example, the first or top level DFD, "303.2.9", refers to the section in MIL-STD-1388-1A which describes the review items. One of the processes (bubbles) on the top level diagram (303.2.9.2) is expanded and identified as "303.2.9.2A", a second level of "303.2.9.2" (Alpha "A" indicates the second level).

Four standard symbols are used in the drawing of a DFD (see Annex E - Figure 1).

A copy of each DFD is presented in Annex B, accompanied by the Data Dictionary process elements. Each entry made in the DFDs has a corresponding entry in the Data Dictionary.

This presents only those Data Dictionary entries necessary for the coordination of the overall concept and details of the processes. To facilitate review of the diagrams, data flow identifications, process, an data store descriptions are provided.

As noted above, they will continue to evolve and be expanded in the System Design phase.

VERT DIAGRAMS

The Venture Evaluation Review Technique (VERT) was developed as a network analysis technique to facilitate management decision making. It allows systematic planning and control of programs and enables managers to find solutions to real life managerial problems. The VERT Diagrams and Input Files for this task can be found in Annex D. In order to understand how these Input Files were developed, a brief discussion of the methodology used is provided. The same explanation is repeated verbatim in every report.

ANNEX A

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LSA TASK 303
EVALUATION OF ALTERNATIVES AND TRADE-OFF ANALYSIS

ANNEX A
LSA TASK 303
EVALUATION OF ALTERNATIVES AND TRADE-OFF ANALYSIS 1/

303.1 **PURPOSE** To determine the preferred support system alternatives(s) for each system/equipment alternative and to participate in alternative system trade-offs to determine the best approach (support, design, and operation) which satisfies the need with the best balance between cost, schedule, performance, readiness, and supportability.

303.2 **TASK DESCRIPTION**

303.2.9 Conduct comparative evaluations between the supportability, cost, and readiness parameters of the new system/equipment and existing comparative systems/equipment. Assess the risks involved in achieving the supportability, cost, and readiness objectives for the new system/equipment based upon the degree of growth over existing system/equipment.

303.3 **TASK INPUT**

303.3.1 Delivery identification of any data item require.

303.3.2 Method of review and approval of identified evaluations and trade-offs to be performed, evaluation criteria, analytical relationships and models to be used, analysis results, and the sensitivity analyses to be performed.

303.3.3 Specific evaluations, trade-offs, or sensitivity analyses to be performed, if applicable.

303.3.4 Specific analytical relationships or models to be used, if applicable.

303.3.5 Any limits (numbers or skills) to operator or support personnel for the system/equipment.

303.3.6 Input not applicable to this subtask.

303.3.7 Support alternatives for the new system/equipment from Task 302.

303.3.8 Description of system/equipment alternatives under consideration.

303.3.9 Supportability and supportability related design objectives, goals and thresholds, and constraints for the new system/equipment from Task 205.

303.3.10 Historical CER/PER that exist which are applicable to the new system/equipment.

303.3.11 Input not applicable to this subtask.

303.4 **TASK OUTPUT**

303.4.1 For each evaluation and trade-off performed under this task:

a. Identification of the evaluation criteria, analytical relationships and models used, selected alternative(s), appropriate sensitivity analysis results, evaluation and trade-off results, and any risks involved.

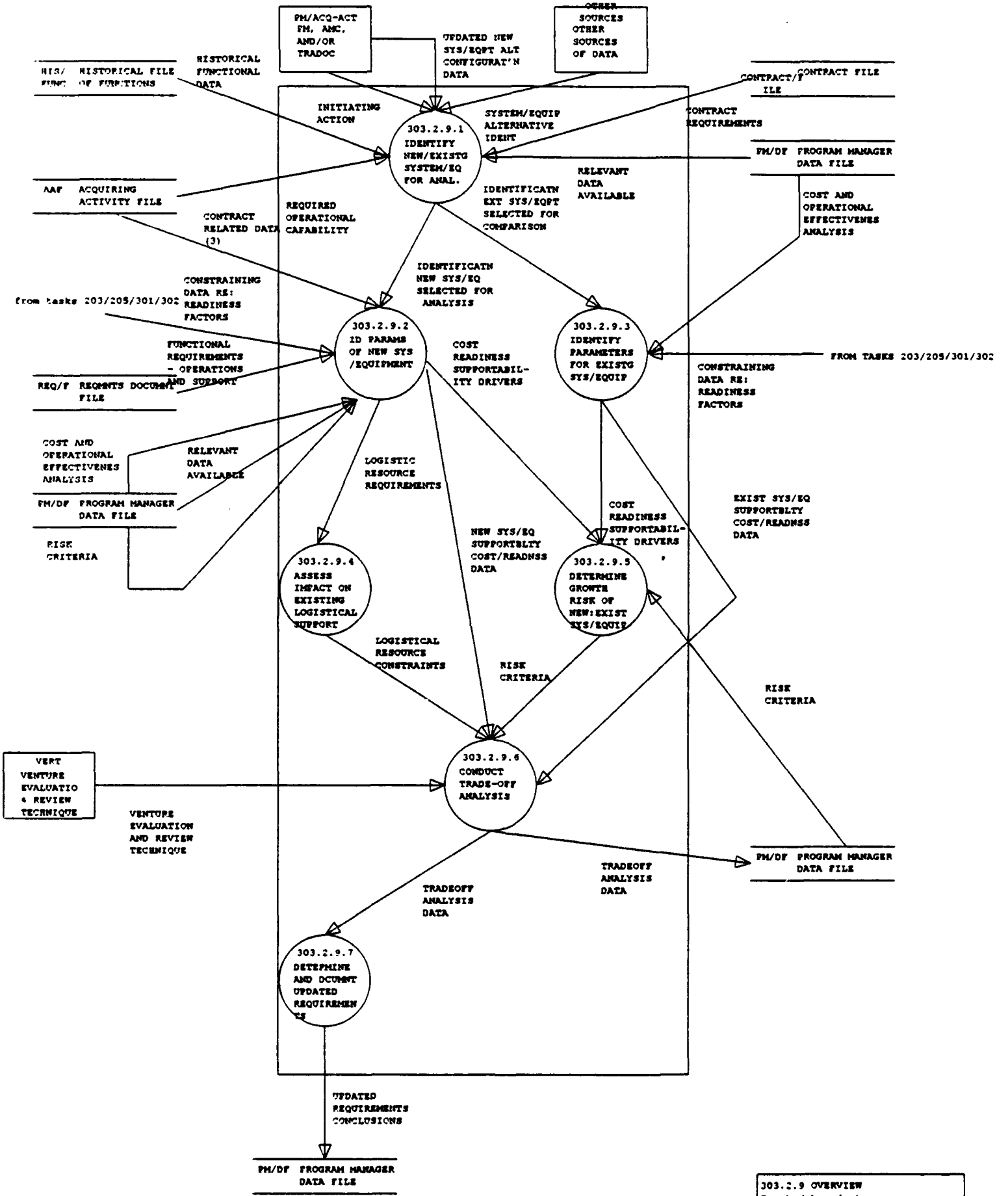
b. Trade-off and evaluation updates, as applicable.

303.4.9 Comparisons between the supportability, cost, and readiness parameters of the new system/equipment and existing comparable systems/equipment. (303.2.9)

1/ Abstracted verbatim from MIL-STD-1388-1A, April 11, 1983, Page 45.

ANNEX B

SUBTASK 303.2.9
COMPARATIVE EVALUATIONS,
DATA FLOW DIAGRAMS AND PROCESS DATA DICTIONARY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(3)
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OF NEW SYS
/EQUIPMENT
303.2.9.3
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FOR EXISTG
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FROM TASKS 203/205/301/302
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FM/DF PROGRAM MANAGER
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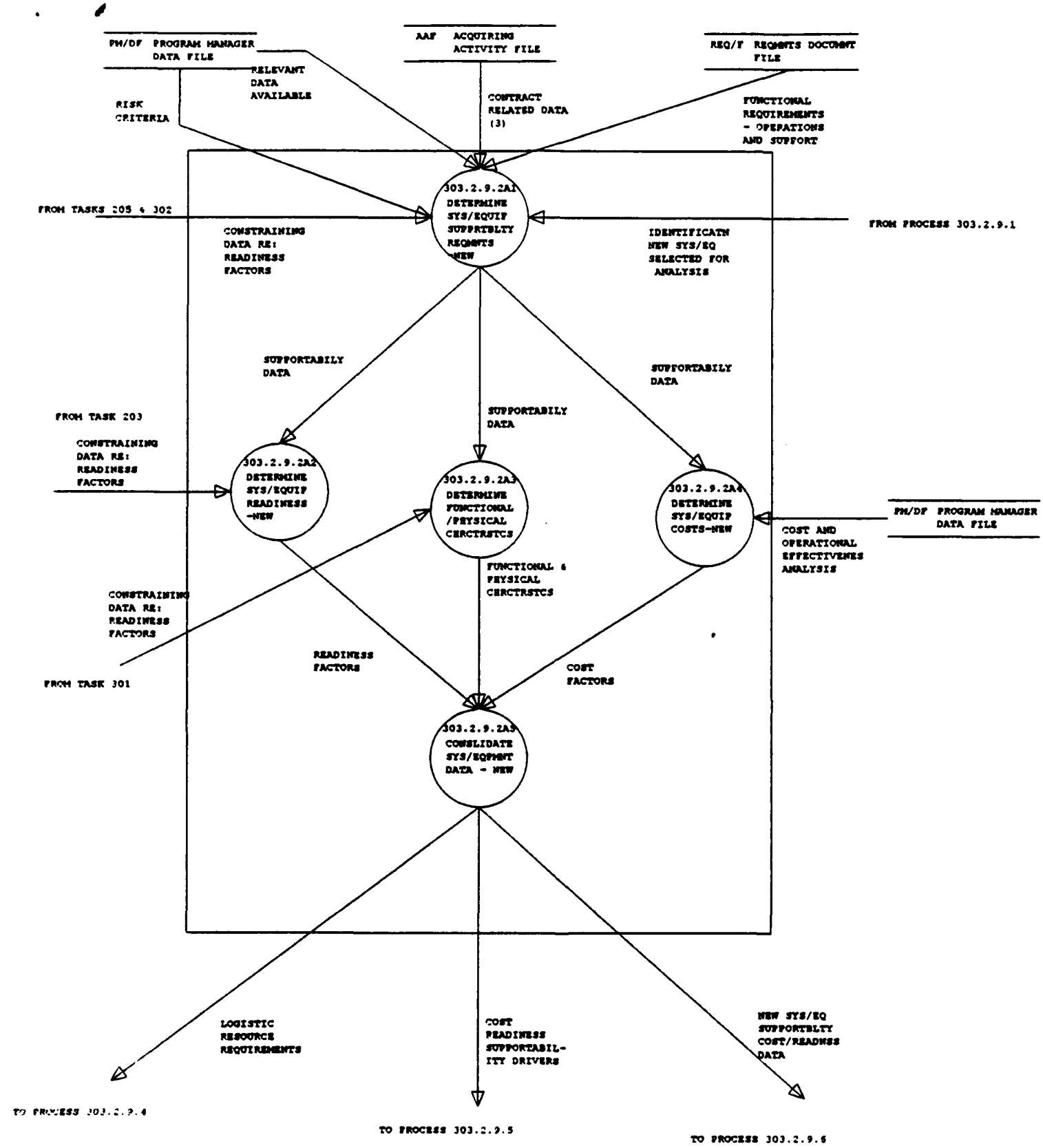
303.2.9 OVERVIEW
Created by: jack
Revised by: sid
Date changed: 21-AUG-90



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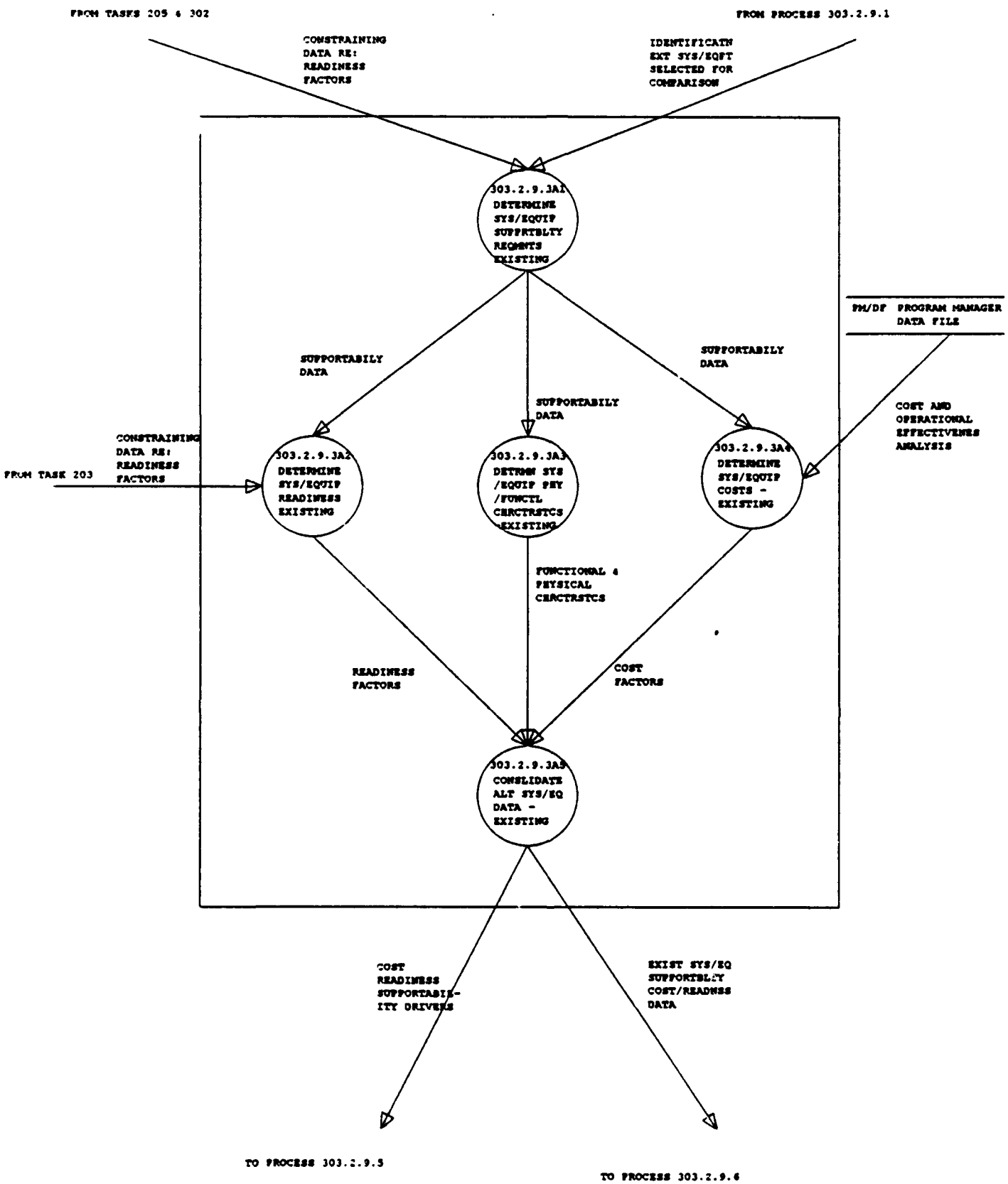

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	Name	Label	Description
	303.2.9.1	IDENTIFY NEW/EXISTG SYSTEM/EQ FOR ANAL.	PURPOSE: To identify the new and existing systems/equipment that will be evaluated to accomplish this process, and to acquire all available information and data for these systems and/or equipment. SOURCE OF DATA: Project Manager System and/or ILS Managers O&O Plan Contract ROC
	303.2.9.2	ID PARAMS OF NEW SYS /EQUIPMENT	PURPOSE: To identify all the parameters of the new system/equipment. A detailed step-by-step description follows.
	303.2.9.2A1	DETERMINE SYS/EQUIP SUPPRTBLTY REQMNTS -NEW	PURPOSE: To identify the Supportability Requirements of the new System/Equipment being evaluated. SOURCE OF DATA: All data and information required for this task is available from the program, item and/or logistic management office responsible for the accomplishment of this program.
	303.2.9.2A2	DETERMINE SYS/EQUIP READINESS -NEW	PURPOSE: To identify the readiness requirements for the new system/equipment being evaluated. SOURCE OF DATA: All data and information required to complete this process is available from the Project or Item Managers for the new system/equipment.
	303.2.9.2A3	DETERMINE FUNCTIONAL /PHYSICAL CHRCTRSTCS	PURPOSE: To determine the functional requirements and physical characteristics of the new system/equipment. SOURCE OF DATA: The project, product or ILS manager should have all the data and information required to accomplish this task.
	303.2.9.2A4	DETERMINE SYS/EQUIP COSTS-NEW	PURPOSE: To identify the costs associated with the new system/ equipment. SOURCE OF DATA: All data and information required to complete this process is available from the Project or Item Manager for the system/ equipment.

	Name	Label	Description
	303.2.9.2A5	CONSLIDATE SYS/EQPMNT DATA - NEW	PURPOSE: To consolidate all data and information developed and collected in Processes 303.2.9.2A1 through 303.2.9.2A4. SOURCE OF DATA: The data required to complete this process comprise the results of Processes 303.2.9.2A1 through 303.2.9.2A4.
	303.2.9.3	IDENTIFY PARAMETERS FOR EXISTG SYS/EQUIP	PURPOSE: To identify all parameters of the existing alternate systems/equipment listed in Process 303.2.9.1. A detailed step-by-step description of this process follows.
	303.2.9.3A1	DETERMINE SYS/EQUIP SUPPRTBLTY REQMNTS EXISTING	PURPOSE: To identify the Supportability Requirements of the existing alternate System/equipment being evaluated. SOURCE OF DATA: All data and information required to accomplish this task is available from the program, item and/or logistic management office responsible for the accomplishment of this program.
	303.2.9.3A2	DETERMINE SYS/EQUIP READINESS EXISTING	PURPOSE: To identify the readiness requirements for each existing system/equipment being evaluated. SOURCE OF DATA: All data and information required to complete this process is available from the Project or Item Managers for the system/equipment.
	303.2.9.3A3	DETRMN SYS /EQUIP PHY /FUNCTL CHRCTRSTCS -EXISTING	PURPOSE: To determine the functional requirements and physical characteristics for each existing system/equipment. SOURCE OF DATA: The project, product or ILS manager should have all the data and information required to accomplish this task.
	303.2.9.3A4	DETERMINE SYS/EQUIP COSTS - EXISTING	PURPOSE: To identify the costs associated with each existing candidate systems/equipment developed in Process 303.2.9.1 SOURCE OF DATA: All data and information required to complete this process is available from the Project or Item Manager for the system/equipment.

	Name	Label	Description
	303.2.9.3A5	CONSLIDATE ALT SYS/EQ DATA - EXISTING	PURPOSE: To consolidate all data and information developed and collected in Processes 303.2.9.3A1 through 303.2.9.3A4. SOURCE OF DATA: The results of Processes 303.2.9.3A1 through 303.2.9.3A4 provide the data required to complete this process.
	303.2.9.4	ASSESS IMPACT ON EXISTING LOGISTICAL SUPPORT	PURPOSE: To assess the impact that the introduction of a new system or piece of equipment will have on the existing or planned integrated logistic support system. SOURCE OF DATA: All plans and documents required to accomplish this process are available from the program, product, item or ILS manager for the system/equipment being evaluated.
	303.2.9.5	DETERMINE GROWTH RISK OF NEW:EXIST SYS/EQUIP	PURPOSE: To assess the growth risks for the existing systems/equipment compared to the new system/equipment. SOURCE OF DATA: All of the data required to accomplish this task should be available from the project or product manager for each system/equipment being evaluated.
	303.2.9.6	CONDUCT TRADE-OFF ANALYSIS	PURPOSE: To evaluate and review the data developed in Processes 303.2.9.2 through 303.2.9.5, and conduct a tradeoff between each of the existing alternate and the new system or equipment. SOURCE OF DATA: All data required to accomplish this process was developed in Processes 303.2.9.2 through 303.2.9.5.
	303.2.9.7	DETERMINE AND DCUMNT UPDATED REQUIREMEN TS	PURPOSE: To review all the data developed in Processes 303.2.9.1 through 303.2.9.6 and update as required. SOURCE OF DATA: All data required to accomplish this process is available from the Project, Product or ILS Managers for the item.

	Name	Label	Description
0	COEA	COST AND OPERATIONAL EFFECTIVENES ANALYSIS	DATA RELATING TO THE INVESTIGATION OF THE COST AND OPERATIONAL EFFFECTIVENESS ANALYSIS FOR THE SYSTEM UNDER INVESTIGATION. THE DATA SHALL CONTAIN AT THE LEAST A COPY OF THE UPDATED COST AND OPERATIONAL EFFECTIVENESS ANALYSIS. REFERENCE: PROGRAM MANAGER'S DATA FILE ACQUIRING ACTIVITY FILES
0	CON/RLTD/DTA(3)	CONTRACT RELATED DATA (3)	THIS DATA CONSISTS OF THREE PARTS: A) ILS SPECS - CONTRACT SOW REQUIREMENTS B) APPLICABLE REVIEW AUDIT/ITEM C) TYPE OF CONTRACT
0	CONTRACT/REQ	CONTRACT REQUIREMENTS	ACRONYMS: RFP REQUEST FOR PROPOSAL SOW STATEMENT OF WORK PURPOSE OF DATA: PROVIDE THE ANALYST WITH THE DETAILS OF THE CONTRACT REQUIREMENTS FOR THE SYSTEM OR THE DESIGN BEING EVALUATED. SOURCE OF DATA: CONTRACT FILE PROCURING AND ENGINEERING ACTIVITIES (RFP. AND SOW)
0	COST/FCTR	COST FACTORS	ACRONYMS: PURPOSE: THIS DATA FLOW CARRIES THE REORGANIZED KEY HIGH DRIVER FACTORS OF THE COST ANALYSIS AND FUNDING ILS ELEMENT AND THE MODELS (MATHEMATICAL &/OR MANUAL) THEY WERE PROCESSED THROUGH IN THE TRADE-OFF ANALYSIS TO ARRIVE AT THE SELECTION OF THIS SYSTEM/EQUIPMENT IN MEETING THE READINESS GOALS OF THIS ILS ELEMENT.
0	COST/READ/SUP/DRVRS	COST READINESS SUPPORTABIL-ITY DRIVERS	THIS DATA FLOW CONTAINS UNIQUE FUNCTIONAL REQUIREMENTS, SUPPORTABILITY COST AND READINESSS DRIVERS AS IDENTIFIED IN PROCESS 301.2.2
0	EXIST/EQ/COST/READ/D	EXIST SYS/EQ SUPPORTBLTY COST/READNSS DATA	THIS DATA FLOW CONTAINS READINESS, SUPPORTABILITY, FUNCTIONAL AND PHYSICAL CHARACTERISTICS DATA FOR EXISTING SYSTEMS/EQUIPMENTS THAT WERE SELECTED AS COMPARABLE SYSTEMS. IT WILL BE USED TO CONDUCT THE TRADE-OFF ANALYSIS.

	Name	Label	Description
0	FUNC/RQRD	FUNCTIONAL REQUIREMENTS - OPERATIONS AND SUPPORT	PURPOSE: IDENTIFICATION OF THE OPERATIONS AND SUPPORT FUNCITONS THAT MUST BE PERFORMED FOR EACH SYSTEM/EQUIPMENT ALTERNATIVE UNDER CONSIDERATION AND THEN IDENTIFICATION OF THE TASKS THAT MUST BE PERFORMED IN ORDER TO OPERATE AND MAINTAIN THE NEW SYSTEM/EQUIPMENT IN ITS INTENDED ENVIRONMENT THESE FUNCTIONS SHALL BE IDENTIFIED TO A LEVEL COMMENSURATE WITH DESIGN AND OPERATIONAL SCENARIO DEVELOPMENT, AND SHALL INCLUDE BOTH PEACETIME AND WARTIME FUNCTIONS. THESE DATA WILL BE AVAILABLE FROM THE CONCEPT FORMULATION PACKAGE WHICH WILL INCLUDE A FEASIBILITY STUDY AS WELL AS ADVANCE PRODUCT PLANNING. THE FEASIBILITY STUDY FROM THE CONCEPT FORMULATION PACKAGE WILL CONSIST OF A NEEDS ANALYSIS, THE SYSTEM OPERATIONS REQUIREMENTS, AND THE SYSTEM MAINTENANCE CONCEPT. ADVANCE PRODUCT PLANNING IS CONCERNED WITH PLANS AND SPECIFICATIONS OF THE EQUIPMENT/SYSTEM. DESCRIPTIVE DATA REQUIRED FOR PROPER ANALYSIS WILL INCLUDE-- 1. WHAT THE NEW SYSTEM/EQUIPMENT MUST DO IN ORDER TO ACCOMPLISH INTENDED MISSION OR TASKS. 2. UNIQUE FUNCTIONS DUE TO NEW TECHNOLOGY IN THE DESIGN OR NEW OPERATIONAL CONCEPTS. 3. IDENTIFICATION OF RISKS INVOLVED WITH THE SUPPORTABILITY OF THE SYSTEM/EQUIPMENT DUE TO FUNCTIONAL REQUIREMENTS. 4. OPERATION AND MAINTENANCE TASKS THAT MUST BE PERFORMED IN ORDER FOR THE NEW SYSTEM/EQUIPMENT TO BE ABLE TO ACCOMPLISH THE IDENTIFIED FUNCTIONS. THE FUNCTIONAL DATA SHOULD CONTAIN AS A MINIMUM: 1. FUNCTIONS REQUIREMENTS - EXAMPLES A. TAKE OFF, FLY, LAND B. MILES PER HOUR - AS IN MINIMUM SPEED C. PROVIDE LIFE SUPPORT TO CREW D. NAVIGATE, USE RADAR E. MAXIMUM/MINIMUM LOAD, ETC. 2. MAINTENANCE SUPPORT REQUIREMENTS - EXAMPLES A. SCHEDULED/UNSCHEDULED TASKS (1. SERVICE/REPAIR (2. OVERHAUL (3. REPLACE/DISCARD, ETC. SOURCE OF DATA: FUNCTIONAL REQUIREMENTS IDENTIFICATION IN SUBTASKS-- 301.2.1 301.2.2 301.2.3 303.2.5.2 401.2.4
0	FUNCT/PHYS/CHRSTCS	FUNCTIONAL & PHYSICAL CHRCTRSTCS	THIS DATA FLOW CARRIES THE FUNCTIONAL AND PHYSICAL CHARACTERISTICS FOR EACH OF THE EXISTING SYSTEMS/EQUIPMENTS THAT WERE SELECTED AS POSSIBLE REPLACEMENT FOR THE NEW SYSTEM/EQUIPMENT.
0	HIST/FUN/DTA	HISTORICAL FUNCTIONAL DATA	HISTORICAL RECORDS OF OPERATIONAL, MAINTENANCE, AND SUPPORT FUNCTIONS OF ITEMS/EQUIPMENT. THESE FUNCTIONS DATA WILL BE USED AS A BASELINE TO PREDICT THE FUNCTIONAL REQUIREMENTS OF THE DEVELOPMENTAL SYSTEM/EQUIPMENT.

	Name	Label	Description
0	INIT/ACT	INITIATING ACTION	PURPOSE: THE REQUIRED ACTIONS OF THOSE (IF MORE THAN ONE) ACTIVITIES NECESSARY TO ACTUATE AN ILS ELEMENT ASSESSMENT FOR A SYSTEM AND/OR EQUIPMENT WHICH PROVIDES THE FORMAL AUTHORIZATION FOR THE PERFORMANCE OF AN ILS EFFORT. THESE INITIATING ACTIONS ARE NORMALLY PERFORMED BY THE ILSMT AND/OR THE PROGRAM MANAGER. WILL INCLUDE DATA IDENTIFYING THE NEED FOR ASSESSING AN ALTERNATIVE SYSTEM/EQUIPMENT AS APPLICABLE. THIS NEED MAY BE BASED ON AN EVALUATION OF THE EXISTING REQUIREMENTS ON THE BASELINE SYSTEM/EQUIPMENT. THIS DATA MAY: 1. ESTABLISH MISSION PROFILE 2. IDENTIFY THE RESOURCES THAT EXIST AND/OR MUST BE DEVELOPED 3. ESTABLISH PRIORITIES SOURCE OF DATA: PROGRAM MANAGER OR ILSMT
0	LOG/RES/CNSTRNTS	LOGISTICAL RESOURCE CONSTRAINTS	THIS DATA FLOW CONTAINS THE LOGISTICAL RESOURCE CONSTRAINTS FOR THE NEW SYSTEM/EQUIPMENT BASED ON THE PRESENTLY AVAILABLE LOGISTICS RESOURCES.
0	LOG/RESRC/REQS	LOGISTIC RESOURCE REQUIREMENTS	THIS DATA FLOW CARRIES THE AMOUNT OF: MANPOWER AND PERSONNEL SUPPLY SUPPORT (PROVISIONING) SUPPORT AND TEST EQUIPMENT TRAINING AND TRAINING DEVICES COMPUTER RESOURCES PACKAGING TRANSPORTATION FACILITIES TECHNICAL MANUALS MAINTENANCE PLANNING THAT NEED TO BE ACQUIRED, TESTED AND DEPLOYED IN SUPPORT OF A MATERIEL SYSTEM. THESE RESOURCES MUST MEET ESTABLISHED READINESS REQUIREMENTS FOR THE MATERIEL SYSTEM.
0	NEW EQ COST/READ/DRV	NEW SYS/EQ SUPPORTBLTY COST/READNSS DATA	THIS DATA FLOW CONTAINS READINESS, SUPPORTABILITY, FUNCTIONAL AND PHYSICAL CHARACTERISTICS FOR THE NEW SYSTEM/EQUIPMENT. IT WILL BE USED TO CONDUCT THE TRADE-OFF ANALYSIS.
0	NEW SYS/EQ ID	IDENTIFICATN NEW SYS/EQ SELECTED FOR ANALYSIS	THIS DATA FLOW CARRIES A DESCRIPTION OF THE NEW SYSTEM/EQUIPMENT PROVIDED BY THE SYSTEM PROJECT MANAGER. IT IS USED TO DETERMINE THE READINESS, COSTS, SUPPORTABILITY, FUNCTIONAL AND PHYSICAL CHARACTERISTIC DATA OF THE NEW SYSTEM/EQUIPMENT.
0	OLD SYS/EQ ID	IDENTIFICATN EXT SYS/EQPT SELECTED FOR COMPARISON	THIS DATA FLOW CONTAINS A DESCRIPTION OF THE EXISTING SYSTEMS/EQUIPMENTS THAT ARE COMPARABLE TO THE NEW SYSTEM/EQUIPMENT. THE DATA IS PROVIDED BY THE SYSTEM PROGRAM MANAGER. IT IS USED TO DETERMINE THE READINESS, COSTS SUPPORTABILITY, FUNCTIONAL AND PHYSICAL CHARACTERISTICS DATA OF THE EXISTING SYSTEMS/EQUIPMENTS.

	Name	Label	Description
0	PAR/DATA	CONSTRAINING DATA RE: READINESS FACTORS	ACRONYMS: PURPOSE: THE DATA IN THIS FLOW IS USED TO PERFORM THE SENSITIVITY ANALYSIS AND CONTAINS DATA GATHERED FROM TASKS 202.2.1 (DESIGN CONSTRAINTS BASED ON COST, MANPOWER, PERSONNEL, READINESS OR SUPPORT) 203.2.5 (READINESS DRIVERS FOR EACH ILS ELEMENT) 203.2.5 (ILS ELEMENT SUPPORT COSTS AND READINESS OBJECTIVES) 301.2.5 (DESIGN ALTERNATIVES TO CORRECT DEFICIENCIES) 303.2.7 (INFORMATION REGARDING THE RLA CONDUCTED WITH AVAILABLE LEVEL OF DESIGN, OPERATION AND SUPPORT DATA AVAILABLE)
0	READNSS/FACTORS	READINESS FACTORS	THIS DATA FLOW CARRIES ALL THE READINESS FACTORS AND REQUIREMENTS FOR THE NEW, AS WELL AS FOR EACH OF THE EXISTING SYSTEMS/EQUIPMENTS SELECTED FOR EVALUATION.
0	REL/DTA/AVAIL	RELEVANT DATA AVAILABLE	ACRONYMS: PURPOSE: THIS DATA FLOW CARRIES SPECIFIC RELEVANT DATA REQUIRED BY A PROCESS, DATA STORE, OR EXTERNAL ENTITY FROM A PROCESS, DATA STORE OR EXTERNAL ENTITY. THE CONTENTS OF THE FLOW CAN BE DETERMINED FROM THE REQUIREMENTS OF THE ENTITY IT ORIGINATES IN AND/OR THE ENTITITY IT FLOWS TO.
0	RISK/CRIT	RISK CRITERIA	THIS DATA FLOW PROVIDES THE ANALYST CRITERIA UPON WHICH TO BASE FUNCTIONAL REQUIREMENTS RISK DETERMINATIONS. THESE CRITERIA ARE DEVELOPED IN PROCESS 301.2.3.6A1
0	ROC	REQUIRED OPERATIONAL CAPABILITY	PORTION OF THE ROC DATA ARE UTILIZED TO ESTABLISH THE POTENTIAL SUPPORT CONCEPTS, READINESS FACTORS, AND COSTS IN ORDER TO DETERMINE THE VIABLE SUPPORT CONCEPT ALTERNATIVES.
0	SUPPORT DATA	SUPPORTABILY DATA	THIS DATA FLOW CONTAINS THE SUPPORTABILITY INFORMATION FOR THE NEW, AS WELL AS FOR EACH OF THE EXISTING SYSTEMS/EQUIPMENTS SELECTED FOR EVALUATION. IT IS USED TO ACCOMPLISH THE TRADE-OFF ANALYSIS.
0	SYS/EQP/ALT/IDENT	SYSTEM/EQUIP ALTERNATIVE IDENT	THE DATA AND DOCUMENTATION PRODUCED BY THE COMBAT DEVELOPER THAT IDENTIFY SYSTEM/EQUIPMENT ALTERNATIVES FULFILLING MISSION AREA REQUIREMENTS.
0	TOA	TRADEOFF ANALYSIS DATA	PURPOSE: TO PROVIDE THE RESULTS OF TRADEOFF ANALYSES PERFORMED ON EACH ALTERNATIVE SYSTEM/EQUIPMENT REQUIRED FOR UPDATING EXISTING ALTERNATIVE SYSTEM/EQUIPMENT CONCEPTS AND NEW ALTERNATIVE SYSTEM/ EQUIPMENT CONCEPTS IN PROCESS 302.2.1 AND UPDATING ALTERNATIVE SUPPORT CONCEPTS AND NEW SUPPORT CONCEPTS IN PROCESS 302.2.2.3 DATA SHOULD ADDRESS OPTIMUN BALANCE BETWEEN THE MANPOWER/PERSONNEL REQUIREMENTS & CHARACTERISTICS OF ALL SYSTEMS/EQUIPMENT UNDER ANALYSIS. 1. DETAILED MANPOWER & PERSONNEL COSTS. 2. COMPLETE OPERATIONS & MAINTENANCE MANPOWER STAFFING NEEDS. 3. PERSONNEL REQUIREMENTS (SKILL LEVEL, APTITUDE, ETC.). SOURCE OF DATA: 303.2.5.5 (CONDUCTING TRADEOFF ANALYSIS).

	Name	Label	Description
0	UPD REQ CONC	UPDATED REQUIREMENTS CONCLUSIONS	THIS DATA FLOW CONTAINS THE LATEST INFORMATION AVAILABLE FOR BOTH THE NEW AND EXISTING SYSTEMS/EQUIPMENTS THAT WERE EVALUATED DURING THE PREVIOUS ITERATIONS OF THE SUBTASK. IT SHOULD BE REVIEWED PRIOR TO EACH SUBMISSION OF THE RESULTS FOR THIS SUBTASK TO THE PROJECT OFFICE.
0	UPD/NEW/SYS/EQPT/ALT	UPDATED NEW SYS/EQPT ALT CONFIGURAT'N DATA	ADDITIONAL DATA DEFINING THE DETAILS OF EXISTING ALTERNATIVE SYSTEM/EQUIPMENT CONFIGURATION OR THE GENERATION OF NEW SYSTEM/EQUIPMENT EXTRACTED FROM THE PROGRAM MANAGERS FILE FOR USE IN THE ANALYSIS PROCESS TO UPDATE EXISTING CONCEPTS AND/OR DEVELOP NEW SUPPORT CONCEPTS.
0	VERT/PROCE	VENTURE EVALUATION AND REVIEW TECHNIQUE	VERT IS A NETWORK ANALYSIS TECHNIQUE USED FOR PERFORMING DECISION RISK ANALYSIS FROM A VARIETY OF PROGRAM ASPECTS. THE TOOL MAKES IT POSSIBLE TO MODEL SYSTEM REQUIREMENTS AND ANALYZE THE OUTCOMES UNDER VARIOUS COST, SCHEDULE, AND MANPOWER CONSTRAINTS.

	Name	Label	Description
0	AAF	ACQUIRING ACTIVITY FILE	CONTAINS THOSE RECORDS, DOCUMENTS, DECISION PAPERS, SCHEDULES THAT WERE PREPARED AS PART OF THE ACQUISITION INITIATION, JUSTIFICATION, AND PLANNING PRIOR TO THE ASSIGNMENT OF A PROGRAM MANAGER. THE ITEMS IN THIS DATA STORE INCLUDE: A. REQUIRED OPERATIONAL CHARACTERISTICS B. O&O PLAN C. DESIRED R&M PARAMETERS D. THREAT ANALYSIS DATA E. READINESS OBJECTIVES DATA F. FUNTIONAL REQUIREMENTS DATA G. PROJECTED SCHEDULE DATA H. LOGISTICS RESOURCES DATA I. TOA J. TOD K. COST & OPERATIONAL EFFECTIVENESS ANALYSIS (COEA) DATA L. PROJECTED COST DATA M. JUSTIFICATION OF MAJOR SYSTEM NEW START (JMSNS) DATA N. DESIGN SPECIFICATIONS
0	CONTRACT/FILE	CONTRACT FILE	PURPOSE: THIS IS A REPOSITORY OF ANY CONTRACTUAL DOCUMENTS AFFECTING THE PROJECT. THIS FILE MAY BE CALLED UPON TO VERIFY WHAT THE CONTRACTOR HAS BEEN TASKED TO DO AND HOW WELL HE HAS DONE IT. SOURCE OF DATA: APPROVED OR UNAPPROVED RFP'S, IFB'S, ANY CHANGES, PROGRESS REPORTS, ETC.
0	HIS/FUNC	HISTORICAL FILE OF FUNCTIONS	THIS FILE CONTAINS AN HISTORICAL RECORD OF OPERATIONAL, MAINTENANCE AND SUPPORT FUNCTIONS OF ITEMS/EQUIPMENT THAT CAN BE USED AS A BASELINE TO FORECAST OR PREDICT THE FUNCTIONAL REQUIREMENTS AND/OR CHARACTERISTICS OF THE DEVELOPMENTAL ITEM/EQUIPMENT.

	Name	Label	Description
0	PM/DF	PROGRAM MANAGER DATA FILE	CONTAINS THOSE FILES AND DATA WHICH ARE NORMALLY DEVELOPED BY AND/OR RETAINED BY THE PROGRAM MANAGER FOR PROPER MANAGEMENT OF THE DEVELOPMENT PROGRAM. THESE FILES INCLUDE: 1. ENGINEERING DRAWINGS 2. ENGINEERING CHARACTERISTICS 3. DT/OT RESULTS 4. CONCEPT FORMULATION PACKAGE (CFP) 5. DESIGN CONCEPT PAPER (DCP) 6. TYPE TECHNICAL REVIEWS REQUIRED 7. MILESTONE SCHEDULES 8. FUNDING PROFILES 9. REQUIRED OPERATIONAL CAPABILITIES (ROC) 10. ITEM/EQUIPMENT SPECIFICATIONS 11. ITEM/EQUIPMENT MISSIONS & FUNCTIONS 12. EQUIPMENT, MANPOWER, AND TECHNICAL RISK ASSESSMENTS (FROM LSA TASK 301.2.3 13. TRADE OFF DETERMINATION ANALYSIS (TOD) 14. TRADE OFF ANALYSIS (TOA) 15. BEST TECHNICAL APPROACH ANALYSIS (BTA) 16. COST AND OPERATIONAL-EFFECTIVENESS ANALYSIS (COEA) 17. HARDWARE SPECIFICATIONS 18. RAM REFQUIREMENTS
0	REQ/F	REQMNTS DOCUMNT FILE	

	Name	Label	Description
0	OTHER SOURCES	OTHER SOURCES OF DATA	THIS ENTITY MAY BE ANOTHER COMMAND, ANOTHER SERVICE (AIR FORCE, NAVY, ARMY, MARINES) OR A PART OF THE DEVELOPMENT COMMUNITY FROM WHOM DEVELOPMENTAL AND OTHER TYPES OF DATA MAY BE REQUIRED. THIS ENTITY DESCRIPTION IS NOT MEANT TO BE RESTRICTIVE AND MAY BE USED FOR THE IDENTIFICATION, ACQUISITION AND SUBSEQUENT UPDATING OF INFORMATION RELEVANT TO THE PROCESS TO/FROM WHICH IT FLOWS.
0	PM/ACQ-ACT	PM, AMC, AND/OR TRADOC	THOSE ACTIVITIES, AGENCIES, OR AUTHORITIES THAT ARE RESPONSIBLE FOR THE REVIEW, APPROVAL, ACCEPTANCE, OR MODIFICATION OF PRODUCTS/ACTIONS WHICH ARE INITITATED AS A PRODUCT OR OUTPUT FROM AN LSA TASK OR SUBTASK OF MIL-STD-1388-1 OR AN ILS ASSESSMENT IN ACCORDANCE WITH AR 700-127. THESE ACTIVITIES, AGENCIES, OR AUTHORITIES ARE CONSIDERED AS THE RECIPIENT (TEMPORARY OR PERMENENT) OF THE PRODUCT OR OUTPUT FROM THESE TASKS/SUBTASKS/ASSESSMENTS. THESE ACTIVITIES, AGENCIES, OR AUTHORITIES COULD INCLUDE THE PROGRAM MANAGER (PM), AMC, OR TRADOC.
0	VERT	VENTURE EVALUATIO & REVIEW TECHNIQUE	A COMPUTERIZED , MATHEMATICALLY ORIENTED SIMULATION NETWORKING TECHNIQUE DESIGNED TO ASSESS RISKS.

ANNEX C

LSA TASK 303.2.9
COMPARATIVE EVALUATIONS

ANNEX C
LSA SUBTASK 303.2.9
COMPARATIVE EVALUATIONS

PROCESS 303.2.9.1 - IDENTIFY THE NEW AND EXISTING SYSTEM/ EQUIPMENT

PURPOSE:

To identify the new and existing systems/equipment that will be evaluated to accomplish this process, and to acquire all available information and data for these systems and/or equipment.

PROCEDURES:

1. Obtain a description of the new system/equipment from the initiating authority. Use this system as the baseline system/equipment when conducting the evaluations.

2. Identify all of the available existing systems/equipment that could be used in place of the new system/equipment, and develop a list of all existing systems/equipment that meet the criteria of being a possible replacement for the new system/equipment. This information can be obtained as follows:

   a. Contact the Item or Project Managers for the new system/equipment and request any available information on existing alternate systems or equipment that could replace the new system/equipment.

   b. Contact the procurement agency within the command that is responsible for the new system/equipment and request information on any existing or proposed systems or equipment, in development or being considered as a new start development program.

   c. Contact TRADOC and request information on any ongoing development programs or systems/equipment which they may be requesting from the development community to meet a need or deficiency, and which might also meet the requirements as an alternate system/equipment for use in this analysis.

   d. Contact the development community in which this type of system/equipment is developed, and request information on any existing or proposed programs resulting in a system or piece of equipment meeting the requirements of this process.

LISTING OF EXISTING SYSTEM/EQUIPMENT AND STATUS CHART
(Process 303.2.9.1)

The following is a listing of the existing systems/ equipment that can be considered as viable replacements for the new system/equipment being analyzed.

Nomenclature	Part Number	Responsible Service/Agency	Status	Availability

e. Contact other commands that may already have, or be in the process of developing, a system or piece of equipment meeting the requirements of this process.

f. Contact other Services, (Air Force, Navy, Marines etc.) using similar systems/equipment, and request information on available items/programs that are ongoing, or being proposed to develop such systems or equipment.

SOURCE OF DATA:

Project Manager
System and/or ILS Managers
O&O Plan
Contract
ROC

PROCESS 303.2.9.2 - IDENTIFY PARAMETERS OF THE NEW SYSTEM/ EQUIPMENT

PURPOSE:

To identify all the parameters of the new system/equipment. A detailed step-by-step description follows.

PROCESS 303.2.9.2A1 - <u>Determine System/Equipment Supportability Requirements</u>

PROCEDURES:

1. Using supportability data from the program/ILS manager's office, determine the supportability requirements for the new system/equipment.

2. If available, the Supportability, Transportability, MANPRINT, Training, Maintainability, Facilities, Depot Maintenance, and Provisioning Plans for the system/ equipment being evaluated will provide the major portion of the information. (Also, depending on where the item is in the development life cycle, various amounts of actual test and evaluation data may also be available.) This data could consist of any of the following, and should be available from the project or maintenance engineering office responsible for the system/equipment.

a. Maintenance Demonstration Data

b. Technical Data Verification and Validation Results

c. Transportability Test Results

d. Maintenance Allocation Chart

e. Training and Training Device Validation

f. Provisioning Data

g. Special Tools and Equipment Data

h. Manpower and Personnel Data (MANPRINT)

i. Facilities Requirements Data

j. Any other physical data that may be available

3. After compilation, consolidate these data to accomplish the comparability process in an efficient and accurate manner. Complete the Data Consolidation Worksheet 303.2.9.2A1.

   a. For each of the areas indicated on the worksheet, describe the support concept requirements. (This listing is not all inclusive nor must it be compiled in this manner.) Additions or deletions from the listing can be made based on the system/equipment being evaluated; however, the list must contain adequate data to support an accurate and comprehensive comparative evaluation.

   b. From the requirements and planning documentation for the new system/equipment, describe the support concept, including all the quantitative and qualitative supportability data. Depending on the status of the program for the system/equipment, data may also be available from test, demonstration, validation and sample data collection reports.

   c. Indicate, in the parameters section, the maximum and minimum amounts of support needed in each requirement area being evaluated. This should include, e.g., MTTR, MTBMA, types and extent of required training (including quantities of support items and personnel). Additionally, any other information or data that could be useful to the comparability evaluation should be included.

NEW SYSTEM/EQUIPMENT SUPPORTABILITY DATA CHART
(Process 303.2.9.2A1)

Scheduled: Completed:

Requirement Areas	Description	Test Data	Parameters
Support Functions			
Program Risk Factors			
Maintenance Concept			
- Tools/TMDE/ATE/ Calibration Equip			
Technical Data			
Training			
Provisioning			
- Support Equip			
Facilities			
Manpower/Personal (MANPRINT)			
Transportation			
POL			
- BDAR			

SOURCE OF DATA:

All data and information required for this task is available from the program, item and/or logistic management office responsible for the accomplishment of this program.

PROCESS 303.2.9.2A2 - Determine New System/Equipment Readiness

PURPOSE:

To identify the readiness requirements for the new system/ equipment being evaluated.

PROCEDURES:

1. Using the description of the new system/equipment provided by the program manager in Process 303.2.9.1, data from Task 203 (Comparative Analysis), and the data available from the program managers' data files, determine the readiness requirements for the new system/equipment.

2. If available, the Supportability, Transportability, Maintainability, Depot Maintenance and Provisioning plans for the system/equipment will provide the major portion of the information required for this process. For development items, the O&O Plan should contain additional readiness data. If the system/equipment has been fielded, the item manager for the system/equipment will have actual availability data from the units in the field.

SOURCE OF DATA:

All data and information required to complete this process is available from the Project or Item Managers for the new system/equipment.

PROCESS 303.2.9.2A3 - Determine Functional and Physical Characteristics

PURPOSE:

To determine the functional requirements and physical characteristics of the new system/equipment.

NEW SYSTEM/EQUIPMENT READINESS REQUIREMENTS
(Process 303.2.9.2A2)

Scheduled: Completed:

Estimated Operational Availability (Ao):

Actual Operational Availability (Ao):

Readiness Requirements Description
(Peacetime/Wartime):

Test Results (if available):

NEW SYSTEM/EQUIPMENT FUNCTIONAL REQUIREMENTS
PHYSICAL CHARACTERISTICS CHART
(Process 303.2.9.2A3)

End Item Name:
Nomenclature:
Part Number:
Requirement Areas:

Requirements for the new system/equipment:

Intended Use of the System/Equipment

Operational Limits of the System/Equipment

Identify any support or Cost Readiness Drivers

Anticipated Service Life

Operational Environment

Basing Concepts

Mobility Requirements

Mission Frequency and Duration

Physical Size and Weight

Testability Characteristics

PROCEDURES:

1. Using the description of the new system/equipment provided by the program manager in Process 303.2.9.1, review all the available data and information on the functional requirements for the new system/equipment. Much of this information is in the functional requirements and operational documents available from the program manager. If completed, use the results of LSA Task 301 (Functional Requirements Identification) for the item to obtain most of the data/information required for this process.

2. Consolidate the data and record it on a chart arranged to provide for the incorporation of all the requirements for the new system/equipment.

   NOTE: Depending on the type or size of the item being evaluated and the quantity of data that must be included in the chart, some systems may require many charts; however, for smaller, less complex items, the data should be recorded on as few charts as possible. Where Large amounts of data are contained in other reports, reference the report in which the information is located. The reference should include the report title, date, preparing agency, and a POC.

   The listing on the chart is provided as a guide only, and should be modified as necessary to satisfy the requirements of the system/equipment being evaluated.

SOURCE OF DATA:

The project, product or ILS manager should have all the data and information required to accomplish this task.

PROCESS 303.2.9.2A4 - Determine New System/Equipment Costs

PURPOSE:

To identify the costs associated with the new system/ equipment.

EXISTING SYSTEM/EQUIPMENT SUPPORT COSTS
(Process 303.2.9.2A4)

Scheduled: Completed:

Requirement Areas	Cost	
	Development	Sustainment
Maintenance Concept		
Tools/TMDE/ATE/Calib. Eq.		
Technical Date		
Training		
Provisioning		
Support Equipment		
Manpower/Personal (MANPRINT)		
Transportation		
POL		
BDAR		

PROCEDURES:

1. Using the description of the new systems/equipment provided by the program manager in Process 303.2.9.1, and the information and data from Processes 303.2.9.2A1, 303.2.9.2A2, and 303.2.9.2A3, determine the support costs for the new system/equipment. Support cost may also be available from LSA Task 3022, System Support Planning.

2. The development costs should be available from the project management office for the program. Even if the program is in the early phases of development, projected production and life cycle support costs should be available.

3. If the system/equipment is in the process of being procured or in production, actual costs should be available from the program/item manager for the system/equipment.

SOURCE OF DATA:

All data and information required to complete this process is available from the Project or Item Manager for the system/equipment.

PROCESS 303.2.9.2A5 - <u>Consolidate New System/Equipment Data</u>

PURPOSE:

To consolidate all data and information developed and collected in Processes 303.2.9.2A1 through 303.2.9.2A4.

PROCEDURES:

1. Collect all the data developed in Processes 303.2.9.2A1 through 303.2.9.2A4. This will consist of a chart developed in Process 303.2.9.2A1, 303.2.9.2A2, and 303.2.9.2A4, containing supportability data, readiness requirements, and support cost. The chart developed in Process 303.2.9.2A3 contains all the functional and physical characteristics. These data must be reviewed and used to accomplish Process 303.2.9.4 (Assess Impact on the Existing and Planned ILS).

2. Review the results of each Process to assure that all data required to accomplish the trade-off analysis is included. Document any notes you have on supportability, cost, and/or readiness in the space provided. This space can also be

CONSOLIDATE NEW SYSTEM/EQUIPMENT DATA
(Process 303.2.9.2A5)

Scheduled: Completed:

Notes on New System/Equipment:

used for notes about the new system equipment or other information you wish to consider in the trade-off analysis.

SOURCE OF DATA:

The data required to complete this process comprise the results of Processes 303.2.9.2A1 through 303.2.9.2A4.

PROCESS 303.2.9.3 - IDENTIFY PARAMETERS OF EXISTING ALTERNATE SYSTEMS/EQUIPMENT

PURPOSE:

To identify all parameters of the existing alternate systems/equipment listed in Process 303.2.9.1. A detailed step-by-step description of this process follows.

PROCESS 303.2.9.3A1 - Determine Existing System/Equipment Supportability Requirements

PROCEDURES:

1. Using the listing of the existing alternate candidate systems/equipment developed in Process 303.2.9.1, determine the supportability requirements for each selected existing alternate systems/equipment.

2. If available, the Supportability, Transportability, MANPRINT, Training, Maintainability, Facilities, Depot Maintenance, and Provisioning Plans for the system/equipment being evaluated will provide the major portion of the information required. (Also, depending on where the item is in the development life cycle, various amounts of actual test and evaluation data may also be available.)

   This data could consist of any of the following, and should be available from the project or maintenance engineering office responsible for the system/equipment:

   a. Maintenance Demonstration Data

   b. Technical Data verification and Validation Results

   c. Transportability Test Results

d. Maintenance Allocation Chart

e. Training and Training Device Validation

f. Provisioning Data

g. Special Tools and Equipment Data

h. Manpower and Personnel Data (MANPRINT)

i. Facilities Requirements Data

j. Any other physical data that may be available

3. After compiling this data, consolidate it to accomplish the comparability process in an efficient and accurate manner. Complete the worksheet provided for the consolidation of the data for each existing systems/equipment under consideration.

   a. For each area indicated on the worksheet, describe the support concept requirements. (This listing is not all inclusive nor does it have to be compiled in this manner.) Additions or deletions can be made based on the system/equipment being evaluated. However, the list must contain adequate data to support an accurate and comprehensive comparative evaluation.

   b. From the requirements and planning documentation for all of the systems/equipment, describe the support concept, including all the quantitative and qualitative supportability data. Depending on the status of the program for each system/equipment, data may also be available from test, demonstration, validation and sample data collection reports.

   c. Indicate in the parameters section, the maximum and minimum amounts of support needed in each requirement area being evaluated. Provide information such as, MTTR, MTBMA, and types and the extent of required training, including quantities of support items and personnel. Additionally, include any other information or data that could be useful to the comparability evaluation.

EXISTING ALTERNATE SYSTEM/EQUIPMENT SUPPORTABILITY DATA CHART
(Process 303.2.9.3A1)

Scheduled: Completed:

Requirement Areas	Description	Test Data	Parameters
Support Functions			
Program Risk Factors			
Maintenance Concept			
- Tools/TMDE/ATE/ Calibration Equip			
Technical Data			
Training			
Provisioning			
- Support Equip			
Facilities			
Manpower/Personal (MANPRINT)			
Transportation			
POL			
- BDAR			

SOURCE OF DATA:

All data and information required to accomplish this task is available from the program, item and/or logistic management office responsible for the accomplishment of this program.

PROCESS 303.2.9.3A2 - Determine System/Equipment Readiness

PURPOSE:

To identify the readiness requirements for each existing system/equipment being evaluated.

PROCEDURES:

1. Using the listing of alternative candidate systems/ equipment developed in Process 303.2.9.1, data from Task 203 (Comparative Analysis), and the data available from the program managers' data files, determine the readiness requirements for each of the systems/equipment.

2. If available, the Supportability, Transportability, Maintainability, Depot Maintenance and Provisioning Plans for the system/equipment provide the major portion of the information required for this process. For development items, the O&O Plan should contain additional readiness data. If the system/equipment has been fielded, the item manager for the system/equipment will have actual availability data assembled from the units in the field.

SOURCE OF DATA:

All data and information required to complete this process is available from the Project or Item Managers for the system/ equipment.

PROCESS 303.2.9.3A3 - Determine Functional and Physical Characteristics

PURPOSE:

To determine the functional requirements and physical characteristics for each existing system/equipment.

EXISTING SYSTEM/EQUIPMENT READINESS REQUIREMENTS
(Process 303.2.9.3A2)

Scheduled: Completed:

Actual Operational Availability (Ao):

Readiness Requirements Description
(Peacetime/Wartime):

Field Date:

PROCEDURES:

1. Using the list developed in Process 303.2.9.1 for the existing alternate candidate systems/equipment, review all the available data and information on the functional requirements for the existing systems/equipment. Much of the information on the functional requirements is in functional requirements and operational documents available from the program/system manager. If possible, determine from the using units how the system is employed and what is required to make it mission capable.

2. To determine support of cost drivers for an existing system, contact the maintenance and/or system engineering office to obtain copies of quality deficiency reports. These reports document operational and support problems for the system/equipment.

3. Contact TRADOC to obtain information on basing concepts and mobility requirements. TRADOC provides assistance in determining functional requirements based on tactical requirements of the system.

4. Consolidate the data and record it on a chart arranged to provide for the incorporation of the requirements for all alternate system/equipment.

   NOTE: Depending on the type or size of the item being evaluated and the quantity of data that must be included in the chart for some systems, many charts may be required. However, for small and less complex items, all data should be included on one chart. Where large amounts of data are contained in other reports, reference the report in which the information is located. The reference should include the report title, date, preparing agency, and a POC.

   The listing on the chart is provided only as a guide, and should be modified as necessary to satisfy the requirements of the system/equipment being evaluated.

SOURCE OF DATA:

The project, product or ILS manager should have all the data and information required to accomplish this task.

EXISTING SYSTEMS/EQUIPMENT FUNCTIONAL REQUIREMENTS
PHYSICAL CHARACTERISTICS CHART
(Process 303.2.9.3A3)

End Item Name:
Nomenclature:
Part Number:
Requirement Areas:

Requirements for each of the existing systems/equipment:

Employed Use of the System/Equipment

Operational Limits of the System/Equipment

Identify any known Support or Cost Readiness Drivers

Service Life

Operational Environment

Basing Concepts

Mobility Requirements

Mission Frequency and Duration

Physical Size and Weight

Testability Characteristics

PROCESS 303.2.9.3A4 - Determine Existing System/Equipment Costs

PURPOSE:

To identify the costs associated with each existing candidate systems/equipment developed in Process 303.2.9.1

PROCEDURES:

1. Using the listing of existing candidate systems/equipment developed in Process 303.2.9.1, and the information and data from Processes 303.2.9.3A1, 303.2.9.3A2, and 303.2.9.3A3, determine the support (development and sustainment) costs for each existing candidate system/ equipment. Yearly sustainment costs should be available from budget request submitted to the item manager.

2. The development costs should be available from the project/ item manager for the system/equipment. Even if the program is in the early phases of development, projected production and life cycle support costs should have been developed.

3. If the system/equipment is in the process of being procured or in production, actual costs should be available from the item manager for the system/equipment.

SOURCE OF DATA:

All data and information required to complete this process is available from the Project or Item Manager for the system/ equipment.

PROCESS 303.2.9.3A5 - Consolidate Existing System/Equipment Data

PURPOSE:

To consolidate all data and information developed and collected in Processes 303.2.9.3A1 through 303.2.9.3A4.

PROCEDURES:

1. Collect all the data developed in Processes 303.2.9.3A1 through 303.2.9.3A4. Review this data and use to accomplish Process 303.2.9.4 (Assess Impact on the Existing and Planned ILS).

CONSOLIDATE EXISTING SYSTEM/EQUIPMENT DATA
(Process 303.2.9.3A5)

Scheduled: Completed:

Notes on existing system/equipment:

2. Review chart all processes to assure that all data required to accomplish the tradeoff analysis is included. If possible, the data for each of the existing systems/ equipment should be incorporated onto one chart. This may not be possible for larger items, and therefore, many charts may be required. Document any notes you may have on supportability cost and/or readiness in the space provided. This space can also be used for notes about the existing system/equipment, or any additional information you may wish to consider in the trade-off analysis.

SOURCE OF DATA:

The results of Processes 303.2.9.3A1 through 303.2.9.3A4 provide the data required to complete this process.

PROCESS 303.2.9.4 - ASSESS IMPACT ON THE EXISTING LOGISTICS SUPPORT

PURPOSE:

To assess the impact that the introduction of a new system or piece of equipment will have on the existing or planned integrated logistic support system.

PROCEDURES:

1. From the O&O Plan or Preliminary Fielding Documentation, determine which units will receive and support the new system/equipment.

2. Obtain copies of their Tables of Distribution and Allowances (TDAs) and Tables of Organization and Equipment. From these documents, determine the logistics resources on hand at these units. (Try to use the categories from Process 303.2.9.2A1.) Determine the total quantity available from the given units.

3. Determine if the new system is to replace an existing system or adds an a capability to the Army. A replacement for an existing equipment means that the support resources for the existing system can be utilized for the new system.

4. Using the data obtained in Process 303.2.9.2A1 through 303.2.9.2A5, obtain the total logistics resource quantities required to operate and support the new system.

ASSESS IMPACT ON EXISTING LOGISTICS SUPPORT
(Process 303.2.9.4)

Type of Fielding for New System/Equipment
(Additional/Replacement):

Discuss Excess/Shortfalls of Logistics
Resources:

5. Compare the new resource requirements to the existing resources available, with consideration of the type of fielding. Determine the resource areas in which excesses and shortfalls exist.

6. Discuss the excess and shortfalls

SOURCE OF DATA:

All plans and documents required to accomplish this process are available from the program, product, item or ILS manager for the system/equipment being evaluated.

PROCESS 303.2.9.5 - DETERMINE SYSTEM/EQUIPMENT GROWTH RISK FACTORS

PURPOSE:

To assess the growth risks for the existing systems/ equipment compared to the new system/equipment.

PROCEDURES:

1. Using the listing of existing systems/equipment developed in Process 303.2.9.1, determine the risks related to the degree of growth in the support concept of the new system/equipment over the existing systems/equipment. If a risk assessment was conducted on the new or existing systems/equipment being evaluated, data on the degree of growth may be available.

2. Consider the percentage of change in RAM and testability factors. Include information on how supportability is improved by incorporating new technology into the system. Examine other logistic areas, such as training devices, new tool and test equipment, and MANPRINT objectives to determine areas of growth and evaluate the risks.

3. Additional data can be obtained using the Venture Evaluation and Review Technique (VERT) to further evaluate the risks of the programs for each systems/equipment.

4. Upon completion of this process, consolidate the data into a report entitled: "Risk Criteria". This report will be used in the tradeoff analysis in Process 303.2.9.6.

SOURCE OF DATA:

All of the data required to accomplish this task should be available from the project or product manager for each system/ equipment being evaluated.

PROCESS 303.2.9.6 - CONDUCT TRADEOFF BETWEEN THE NEW AND EXISTING SYSTEMS/EQUIPMENT

PURPOSE:

To evaluate and review the data developed in Processes 303.2.9.2 through 303.2.9.5, and conduct a tradeoff between each of the existing alternate and the new system or equipment.

PROCEDURES:

1. Based on the type of system being analyzed, develop a weighting system to rank the importance of each of the characteristics of supportability, cost, and readiness analyzed.

2. Develop a rating system to be applied to each characteristic of supportability, cost and readiness for the new system/equipment and existing system/equipment.

3. Select a rating for each system/equipment in this analysis.

4. Multiply the ranking against the weighting factor to get an adjusted ranking. total the adjusted rankings to develop a weighted average score for the system/equipment.

5. Based on th4e weighted average scores of the system/ equipment, select the system with the highest score. This system is the preferred system from a supportability, cost, and schedule point of view. (Remember that the existing systems provided by the PM were equally capable of performing the mission.)

SOURCE OF DATA:

All data required to accomplish this process was developed in Processes 303.2.9.2 through 303.2.9.5.

TRADE-OFF MATRIX
(Process 303.2.9.6)

Scheduled: Completed:

Characteristics	Weighting Factor	Systems Ratings New	Alt 1	Alt 2

PROCESS 303.2.9.7 - REVIEW AND UPDATE DATA AS REQUIRED

PURPOSE:

To review all the data developed in Processes 303.2.9.1 through 303.2.9.6 and update as required.

PROCEDURES:

1. For small or less sophisticated items, this process may not be necessary, but in some cases, extended periods of time may have lapsed between the completion of many of the processes. Therefore, this process should be conducted to assure that the data contained in the final report is current.

2. Using the charts and worksheets developed during the various processes, contact the project officers responsible for the items being evaluated to determine if there have been changes in requirements for the new developmental item, and whether any new data has become available.

3. Update the data as required.

SOURCE OF DATA:

All data required to accomplish this process is available from the Project, Product or ILS Managers for the item.

COMPARATIVE EVALUATION UPDATE
(Process 303.2.9.7)

Scheduled: Completed:

Notes on Update:

ANNEX D

LSA SUBTASK 303.2.9
VERT APPLICATION METHODOLOGY

VERT APPLICATION METHODOLOGY

BACKGROUND:

Venture Evaluation and Review Technique (VERT) was developed as a network analysis technique to facilitate management decision making. It allows a systematic planning and control of programs and enables managers to find solutions to real life managerial problems.

The terms of the APJ contract require the provision of batch files for each of the VERT networks associated with the various Data Flow Diagrams in the APJ 966 projects.

APJ has been successful in adopting a method for the creation of these networks using the existing EXCELERATOR software package and establishing a naming convention compatible with that used in the Data Flow Diagrams. To do this APJ has made use of the PC model of VERT. A Structured Analysis project was used for this purpose. The prototype VERT network structure was made for one top level and one lower level data flow diagram.

The PC model of VERT has certain limitations built into it. To overcome some of these limitations, certain conventions were used to create the input files. To maintain full generality a set of "dummy" default values were established. The model allows the user to alter the default values of time, cost, and performance to satisfy their specific requirements.

METHODOLOGY:

The basic symbols used to structure the network are :

(i) **SQUARES** - to indicate NODES. These are decision points in the project, or points beyond which the project cannot proceed unless certain criteria are met. There are two types of nodes, one which supports input operations and, the second type which supports output operations.

(ii) **LINES** - to indicate ARCS which are activities that have time, cost, and performance criteria associated with them.

In practice, however, both the arcs and nodes are similar, in that both have time, cost, and performance criteria associated with them. The arcs have a primary and a cumulative set of time, cost, and performance criteria whereas the nodes have only a single cumulative set.

(iii) **NAMING CONVENTIONS** - Efforts have been made to keep the naming convention as compatible as possible to the Data Flow Diagrams. The naming convention used is displayed below.

NODES - All nodes are prefixed with the letter **N**. The individual Nodes are identified by a number and a letter. The number refers to the number of the node within the diagram and the letter refers to the diagram number in the project. In the event that a node has been referenced in an earlier diagram they also carry the number of the node in the earlier diagram as a prefix to the individual node number.

N2.4A

N - All nodes are prefixed with the letter **N**

2 - Gives the number of the node it relates to in a higher level diagram or an earlier data flow diagram within the project. In this case it refers to node **N2** of the top level diagram.

4 - Gives the number of the node in the present data flow diagram.

A - The nodes in each subsequent explosion are allotted an alphabetical suffix indicating the number of the explosion diagram in the particular project. In this case, it is the first lower level diagram within the project.

ARCS - All arcs are prefixed with either the letter **C** or **E**. The individual Arcs are identified by two numbers. The first number refers to the number of the arc within the diagram and the second number refers to the number of the diagram within the project. In the event that an arc has been referenced in an earlier diagram they also carry the number of the arc in the earlier diagram as a prefix to the individual arc number. The arcs which are identified by the letter **E** have direct reference to a process in the corresponding data flow diagram and as such are named the same as the process itself.

C3.3.8.4 **E12.1A2**

C - All arcs are prefixed with the letter C. In some cases, however, arcs carry a prefix of **E**. These particular arcs correspond to a process within the data flow diagram and are thus named the same as the process itself.

3.3 - Gives the number of the arc it relates to in a higher level diagram or an earlier data flow diagram within the project. In this case, it refers to arc number 3 in lower level diagram #3 within the project.

8.4 - Indicates that this particular arc is the #8 arc in the #4 lower level diagram of the project.

BATCH FILES

INPUT FILES - The input file names are given the extension ***.IN**.

OUTPUT FILES - The simulation output files are given the extension ***.OU**.

PRINT FILES - The print files have been given the extension ***.PR**.

(This would allow subsequent updates of the input files to be numbered as **IN1...,OU1...,PR1...** etc.)

DEFAULT SETTINGS:

Control Record:

(i) The output option selected is "0" which provides a detailed listing, and high level of summary information.

(ii) The input record listing option selected is "0" which prints all input records.

(iii) The composite terminal node output option selected is "16" which assumes family mode and intrafamily transfer of histogram data.

(iv) The number of iterations used are "10" in the demonstration model to facilitate operation in the debug mode if required.

(v) The composite node name and the network name are left as blanks.

(vi) In the run identification the name of the corresponding Data Flow Diagram is used as identification for the network description.

Arc Records:

(i) For each of the arcs the following records are provided:

(a) Master Arc Record
(b) Time Distribution Satellite
(c) Cost Distribution Satellite
(d) Performance Distribution Satellite

(ii) The Distribution Satellite Records are created to provide a uniform statistical distribution.

(iii) The default values used for the minimum and maximum in each criteria are:

TIME	10.0	20.0
COST	10.0	100.0
PERFORMANCE	10.0	50.0

Node Records:

(i) Input Logic - The input logic for the nodes are either "**INITIAL**" or "**AND**".

(ii) Output Logic - The output logic has been defaulted to "**AND**" or "**TERMINAL**".

(iii) The output option indicator and the storage option indicator are defaulted to read "0".

(iv) The node description has also been left blank.

(It is again noted that the user can change the default values to desired values as identified by the particular requirement and applications.)

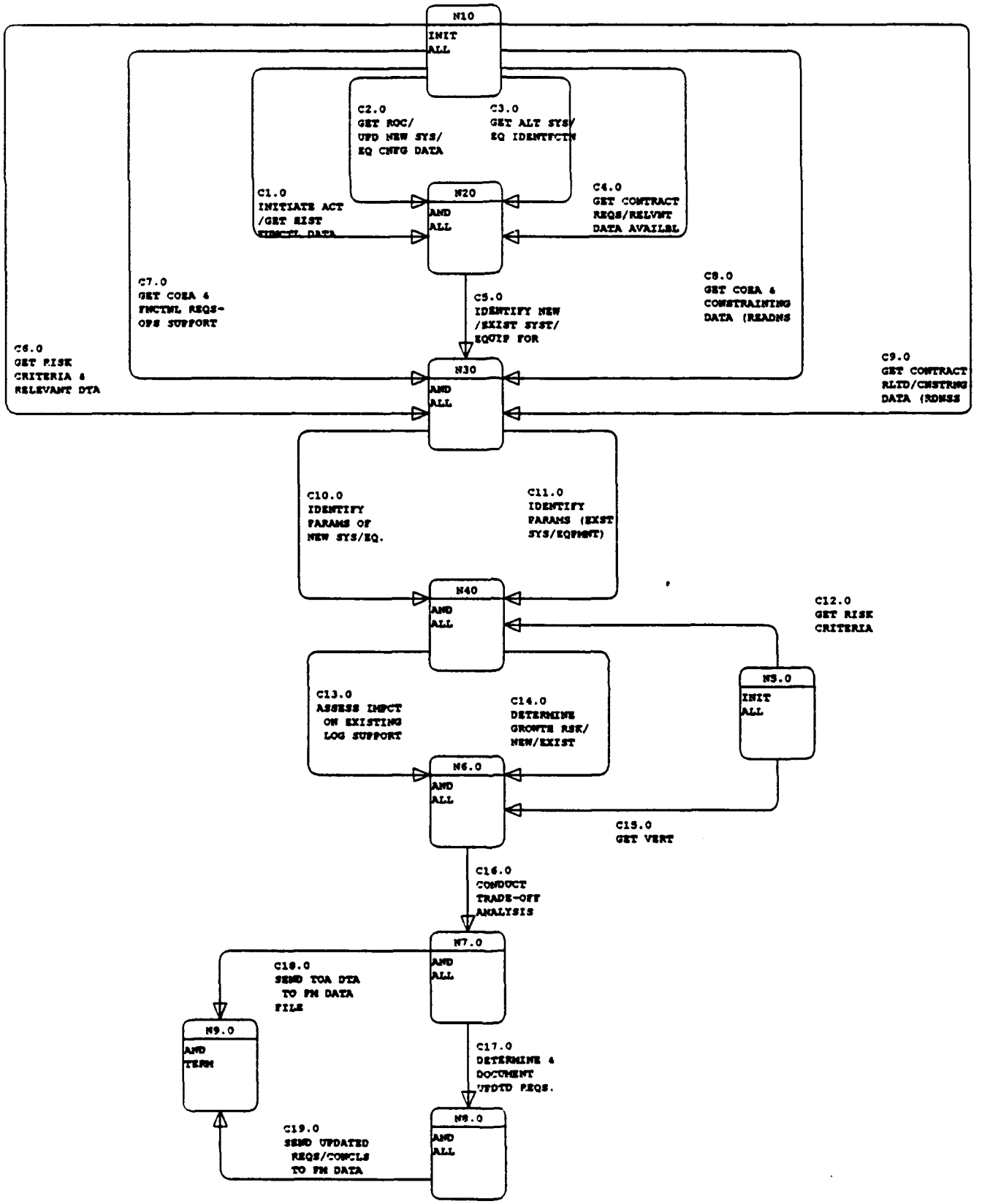
DOCUMENTATION:

With every project report APJ will be providing the following documents relating to the VERT:

(i) A VERT network diagram corresponding to a particular data flow diagram.

(ii) A print out of the VERT network inputs for the particular data flow diagrams.

(iii) A floppy disc containing sample input, print, and the simulation output files for the default VERT network.



303.2.9 V OVERVIEW
Created by: jack
Revised by: jack
Date changed: 17-AUG-90

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                1           2           3           4           5           6           7           8
      12345678901234567890123456789012345678901234567890123456789012345678901234567890
   1. 0016  10                    SUPPORTABILITY, COST AND READINESS
                +           +           +           +           +           +           +           +
   2. C1.0      N1.0      N2.0      1.0 INITIATE ACTIVITY & GET HISTORICAL FUNCTIONAL DAT
   3. C1.0      DTIME 1          2       10.0      20.0
   4. C1.0      DCOST 1          2       10.0     100.0
   5. C1.0      DPERF 1          2       10.0      50.0
                +           +           +           +           +           +           +           +
   6. C2.0      N1.0      N2.0      1.0 GET ROC & UPDATE THE NEW SYS/EQUIP CONFIG'N DATA
   7. C2.0      DTIME 1          2       10.0      20.0
   8. C2.0      DCOST 1          2       10.0     100.0
   9. C2.0      DPERF 1          2       10.0      50.0
                +           +           +           +           +           +           +           +
  10. C3.0      N1.0      N2.0      1.0 GET ALTERNATIVE SYSTEM/EQUIPMENT IDENTIFICATION
  11. C3.0      DTIME 1          2       10.0      20.0
  12. C3.0      DCOST 1          2       10.0     100.0
  13. C3.0      DPERF 1          2       10.0      50.0
                +           +           +           +           +           +           +           +
  14. C4.0      N1.0     N2.0     1.0 GET CONTRACT REQS & RELEVANT DATA AVAILABLE
  15. C4.0      DTIME 1          2       10.0      20.0
  16. C4.0      DCOST 1          2       10.0     100.0
  17. C4.0      DPERF 1          2       10.0      50.0
                +           +           +           +           +           +           +           +
  18. C5.0      N2.0     N3.0     1.0 ID. NEW & EXISTING SYS/EQUIP FOR ANALYSIS
  19. C5.0      DTIME 1          2       10.0      20.0
  20. C5.0      DCOST 1          2       10.0     100.0
  21. C5.0      DPERF 1          2       10.0      50.0
                +           +           +           +           +           +           +           +
  22. C6.0      N1.0     N3.0     1.0 GET RISK CRITERIA & RELEVANT DATA AVAILABLE
  23. C6.0      DTIME 1          2       10.0      20.0
  24. C6.0      DCOST 1          2       10.0     100.0
  25. C6.0      DPERF 1          2       10.0      50.0
                +           +           +           +           +           +           +           +
  26. C7.0      N1.0     N3.0     1.0 GET COEA & FUNCTIONAL REQS - OPS SUPPORT
  27. C7.0      DTIME 1          2       10.0      20.0
  28. C7.0      DCOST 1          2       10.0     100.0
  29. C7.0      DPERF 1          2       10.0      50.0
                +           +           +           +           +           +           +           +
  30. C8.0      N1.0     N3.0     1.0 GET COEA & CONSTRAINING DATA RE: READINESS FACTORS
  31. C8.0      DTIME 1          2       10.0      20.0
  32. C8.0      DCOST 1          2       10.0     100.0
  33. C8.0      DPERF 1          2       10.0      50.0
                +           +           +           +           +           +           +           +
  34. C9.0      N1.0     N3.0     1.0 GET CONTRACT RELATED DATA & CONSTRAING DATA (RDNSS)
  35. C9.0      DTIME 1          2       10.0      20.0
  36. C9.0      DCOST 1          2       10.0     100.0
  37. C9.0      DPERF 1          2       10.0      50.0
                +           +           +           +           +           +           +           +
  38. C10.0     N3.0     N4.0     1.0 IDENTIFY PARAMETERS OF NEW SYSTEM/EQUIPMENT
  39. C10.0     DTIME 1          2       10.0      20.0
  40. C10.0     DCOST 1          2       10.0     100.0
  41. C10.0     DPERF 1          2       10.0      50.0
                +           +           +           +           +           +           +           +
  42. C11.0     N3.0     N4.0     1.0 IDENTIFY PARAMETERS OF EXISTING SYSTEM/EQUIPMENT
  43. C11.0     DTIME 1          2       10.0      20.0
  44. C11.0     DCOST 1          2       10.0     100.0
  45. C11.0     DPERF 1          2       10.0      50.0
                +           +           +           +           +           +           +           +
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          1        2        3        4        5        6        7        8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
1          N E W    N E T W O R K                PAGE  2
          1        2        3        4        5        6        7        8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
   46. C12.0   N5.0    N4.0     1.0 GET RISK CRITERIA
   47. C12.0   DTIME 1         2      10.0      20.0
   48. C12.0   DCOST 1         2      10.0     100.0
   49. C12.0   DPERF 1         2      10.0      50.0
               +        +        +        +        +        +        +        +
   50. C13.0   N4.0    N6.0     1.0 ASSESS IMPACT ON EXISTING LOGISTICS SUPPORT
   51. C13.0   DTIME 1         2      10.0      20.0
   52. C13.0   DCOST 1         2      10.0     100.0
   53. C13.0   DPERF 1         2      10.0      50.0
               +        +        +        +        +        +        +        +
   54. C14.0   N4.0    N6.0     1.0 DETERMINE GROWTH RISK FOR NEW & EXISTING SYS/EQUIP
   55. C14.0   DTIME 1         2      10.0      20.0
   56. C14.0   DCOST 1         2      10.0     100.0
   57. C14.0   DPERF 1         2      10.0      50.0
               +        +        +        +        +        +        +        +
   58. C15.0   N5.0    N6.0     1.0 GET VERT DATA
   59. C15.0   DTIME 1         2      10.0      20.0
   60. C15.0   DCOST 1         2      10.0     100.0
   61. C15.0   DPERF 1         2      10.0      50.0
               +        +        +        +        +        +        +        +
   62. C16.0   N6.0    N7.0     1.0 CONDUCT TRADE-OFF ANALYSIS
   63. C16.0   DTIME 1         2      10.0      20.0
   64. C16.0   DCOST 1         2      10.0     100.0
   65. C16.0   DPERF 1         2      10.0      50.0
               +        +        +        +        +        +        +        +
   66. C17.0   N7.0    N8.0     1.0 DETERMINE & DOCUMENT UPDATED REQUIREMENTS
   67. C17.0   DTIME 1         2      10.0      20.0
   68. C17.0   DCOST 1         2      10.0     100.0
   69. C17.0   DPERF 1         2      10.0      50.0
               +        +        +        +        +        +        +        +
   70. C18.0   N7.0    N9.0     1.0 SEND TOA DATA TO PM/DATA FILE
   71. C18.0   DTIME 1         2      10.0      20.0
   72. C18.0   DCOST 1         2      10.0     100.0
   73. C18.0   DPERF 1         2      10.0      50.0
               +        +        +        +        +        +        +        +
   74. C19.0   N8.0    N9.0     1.0 SEND UPADTED REQUIREMENTS & CONCLUSIONS TO PM/DF
   75. C19.0   DTIME 1         2      10.0      20.0
   76. C19.0   DCOST 1         2      10.0     100.0
   77. C19.0   DPERF 1         2      10.0      50.0
               +        +        +        +        +        +        +        +
   78. ENDARC
               +        +        +        +        +        +        +        +
   79. N1.0    1  2 0 0
               +        +        +        +        +        +        +        +
   80. N2.0    2  2 0 0
               +        +        +        +        +        +        +        +
   81. N3.0    2  2 0 0
               +        +        +        +        +        +        +        +
   82. N4.0    2  2 0 0
               +        +        +        +        +        +        +        +
   83. N5.0    1  2 0 0
               +        +        +        +        +        +        +        +
   84. N6.0    2  2 0 0
               +        +        +        +        +        +        +        +
   85. N7.0    2  2 0 0
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                +       +       +       +       +       +       +       +
               .1       2       3       4       5       6       7       8
      12345678901234567890123456789012345678901234567890123456789012345678901234567890
1       N E W   N E T W O R K             PAGE  3
               1       2       3       4       5       6       7       8
      12345678901234567890123456789012345678901234567890123456789012345678901234567890
   86. N8.0    2  2 0 0
                +       +       +       +       +       +       +       +
   87. N9.0    2  1 0 0
                +       +       +       +       +       +       +       +
   88. ENDNODE
               1       2       3       4       5       6       7       8
      12345678901234567890123456789012345678901234567890123456789012345678901234567890
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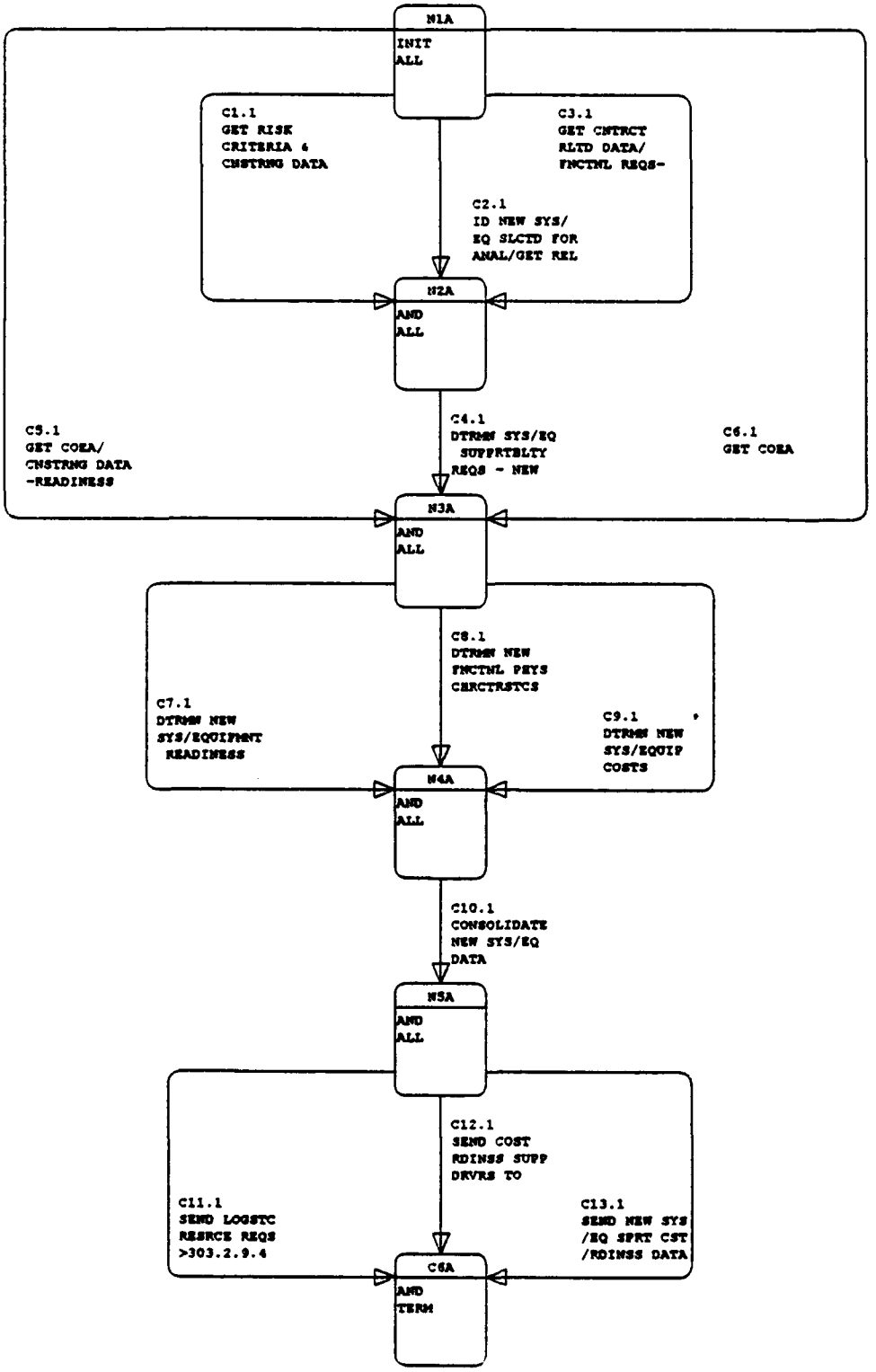

303.2.9.2A V NEW SYS PARAMS
Created by: jack
Revised by: jack
Date changed: 17-AUG-90

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. 1 .     N E W   N E T W O R K                PAGE  1
                1       2       3       4       5       6       7       8
       12345678901234567890123456789012345678901234567890123456789012345678901234567890
    1. 0016  10                NEW SYSTEM/EQUIPMENT PARAMETERS
                +       +       +       +       +       +       +       +
    2. C1.1     N1A     N2A      1.0 GET RISK CRITERIA & CONSTRAINING DATA - READINESS
    3. C1.1     DTIME 1         2       10.0      20.0
    4. C1.1     DCOST 1         2       10.0     100.0
    5. C1.1     DPERF 1         2       10.0      50.0
                +       +       +       +       +       +       +       +
    6. C2.1     N1A     N2A      1.0 ID. NEW SYS/EQUIP FOR ANALYSIS/GET RLVNT DATA AVAIL
    7. C2.1     DTIME 1         2       10.0      20.0
    8. C2.1     DCOST 1         2       10.0     100.0
    9. C2.1     DPERF 1         2       10.0      50.0
                +       +       +       +       +       +       +       +
   10. C3.1     N1A     N2A      1.0 GET CONTRACT RELATED DATA/FUNCTIONAL REQUIREMENTS
   11. C3.1     DTIME 1         2       10.0      20.0
   12. C3.1     DCOST 1         2       10.0     100.0
   13. C3.1     DPERF 1         2       10.0      50.0
                +       +       +       +       +       +       +       +
   14. C4.1     N2A     N3A      1.0 DETERMINE NEW SYSTEM EQUIPMENT SUPPORTABILITY REQS
   15. C4.1     DTIME 1         2       10.0      20.0
   16. C4.1     DCOST 1         2       10.0     100.0
   17. C4.1     DPERF 1         2       10.0      50.0
                +       +       +       +       +       +       +       +
   18. C5.1     N1A     N3A      1.0 GET COEA/CONSTRAINING DATA - READINESS
   19. C5.1     DTIME 1         2       10.0      20.0
   20. C5.1     DCOST 1         2       10.0     100.0
   21. C5.1     DPERF 1         2       10.0      50.0
                +       +       +       +       +       +       +       +
   22. C6.1     N1A     N3A      1.0 GET COEA
   23. C6.1     DTIME 1         2       10.0      20.0
   24. C6.1     DCOST 1         2       10.0     100.0
   25. C6.1     DPERF 1         2       10.0      50.0
                +       +       +       +       +       +       +       +
   26. C7.1     N3A     N4A      1.0 DETERMINE NEW SYSTEM/EQUIPMENT READINESS
   27. C7.1     DTIME 1         2       10.0      20.0
   28. C7.1     DCOST 1         2       10.0     100.0
   29. C7.1     DPERF 1         2       10.0      50.0
                +       +       +       +       +       +       +       +
   30. N8.1     N3A     N4A      1.0 DETERMINE NEW SYS/EQUIP FNCTNL/PHYSICAL CHRCTRSTCS
   31. N8.1     DTIME 1         2       10.0      20.0
   32. N8.1     DCOST 1         2       10.0     100.0
   33. N8.1     DPERF 1         2       10.0      50.0
                +       +       +       +       +       +       +       +
   34. C9.1     N3A     N4A      1.0 DETERMINE NEW SYSTEM/EQUIPMENT COSTS
   35. C9.1     DTIME 1         2       10.0      20.0
   36. C9.1     DCOST 1         2       10.0     100.0
   37. C9.1     DPERF 1         2       10.0      50.0
                +       +       +       +       +       +       +       +
   38. C10.1    N4A     N5A      1.0 CONSOLIDATE NEW SYSTEM/EQUIPMENT DATA
   39. C10.1    DTIME 1         2       10.0      20.0
   40. C10.1    DCOST 1         2       10.0     100.0
   41. C10.1    DPERF 1         2       10.0      50.0
                +       +       +       +       +       +       +       +
   42. C11.1    N5A     N6A      1.0 SEND LOGISTIC RESOURCE REQS TO PROCESS 303.2.9.4
   43. C11.1    DTIME 1         2       10.0      20.0
   44. C11.1    DCOST 1         2       10.0     100.0
   45. C11.1    DPERF 1         2       10.0      50.0
                +       +       +       +       +       +       +       +
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.          1         2         3         4         5         6         7         8
    12345678901234567890123456789012345678901234567890123456789012345678901234567890
1        N E W    N E T W O R K                PAGE   2
           1         2         3         4         5         6         7         8
    12345678901234567890123456789012345678901234567890123456789012345678901234567890
   46. C12.1   N5A     N6A      1.0 SEND COST, READINESS & SUPPRT'Y DRVRS > 303.2.9.5
   47. C12.1   DTIME 1         2      10.0      20.0
   48. C12.1   DCOST 1         2      10.0     100.0
   49. C12.1   DPERF 1         2      10.0      50.0
               +         +         +         +         +         +         +         +
   50. C13.1   N5A     N6A      1.0 SEND COST, READINESS, SUPPRT'Y DATA TO 303.2.9.6
   51. C13.1   DTIME 1         2      10.0      20.0
   52. C13.1   DCOST 1         2      10.0     100.0
   53. C13.1   DPERF 1         2      10.0      50.0
               +         +         +         +         +         +         +         +
   54. ENDARC
               +         +         +         +         +         +         +         +
   55. N1A     1  2 0 0
               +         +         +         +         +         +         +         +
   56. N2A     2  2 0 0
               +         +         +         +         +         +         +         +
   57. N3A     2  2 0 0
               +         +         +         +         +         +         +         +
   58. N4A     2  2 0 0
               +         +         +         +         +         +         +         +
   59. N5A     2  2 0 0
               +         +         +         +         +         +         +         +
   60. N6A     2  1 0 0
               +         +         +         +         +         +         +         +
   61. ENDNODE
           1         2         3         4         5         6         7         8
    12345678901234567890123456789012345678901234567890123456789012345678901234567890
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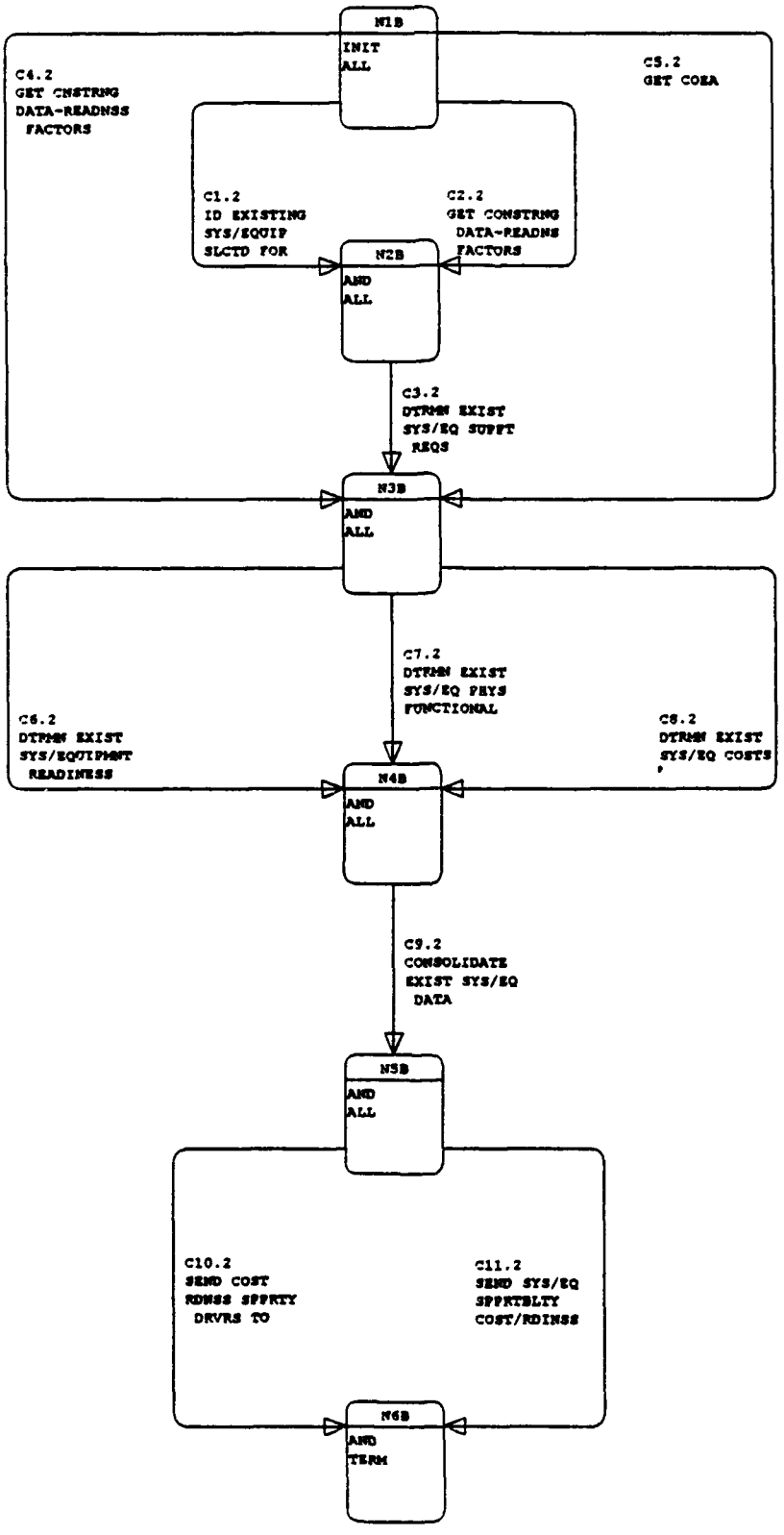

303.2.9.3A V EXIST SYS/EQ PARAMS
Created by: jack
Revised by: sid
Date changed: 17-AUG-90

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1 .     N E W   N E T W O R K              PAGE  1
              1        2        3        4        5        6        7        8
     12345678901234567890123456789012345678901234567890123456789012345678901234567890
  1. 0016  10                EXISTING SYSTEM/EQUIPMENT PARAMETERS
                +        +        +        +        +        +        +        +
  2. C1.2    N1B      N2B       1.0 IDENTIFY EXISTING SYSTEM/EQUIPMENT FOR ANALYSIS
  3. C1.2    DTIME 1          2       10.0      20.0
  4. C1.2    DCOST 1          2       10.0     100.0
  5. C1.2    DPERF 1          2       10.0      50.0
                +        +        +        +        +        +        +        +
  6. C2.2    N1B      N2B       1.0 GET CONSTRAINING DATA RE: READINESS FACTORS
  7. C2.2    DTIME 1          2       10.0      20.0
  8. C2.2    DCOST 1          2       10.0     100.0
  9. C2.2    DPERF 1          2       10.0      50.0
                +        +        +        +        +        +        +        +
 10. C3.2    N2B      N3B       1.0 DETERMINE EXISTING SYSTEM/EQUIP SUPPORTABILITY REQS
 11. C3.2    DTIME 1          2       10.0      20.0
 12. C3.2    DCOST 1          2       10.0     100.0
 13. C3.2    DPERF 1          2       10.0      50.0
                +        +        +        +        +        +        +        +
 14. C4.2    N1B      N3B       1.0 GET CONSTRAINING DATA RE: READINESS FACTORS
 15. C4.2    DTIME 1          2       10.0      20.0
 16. C4.2    DCOST 1          2       10.0     100.0
 17. C4.2    DPERF 1          2       10.0      50.0
                +        +        +        +        +        +        +        +
 18. C5.2    N1B      N3B       1.0 GET COEA
 19. C5.2    DTIME 1          2       10.0      20.0
 20. C5.2    DCOST 1          2       10.0     100.0
 21. C5.2    DPERF 1          2       10.0      50.0
                +        +        +        +        +        +        +        +
 22. C6.2    N3B      N4B       1.0 DETERMINE EXISTING SYSTEM/EQUIPMENT READINESS
 23. C6.2    DTIME 1          2       10.0      20.0
 24. C6.2    DCOST 1          2       10.0     100.0
 25. C6.2    DPERF 1          2       10.0      50.0
                +        +        +        +        +        +        +        +
 26. C7.2    N3B      N4B       1.0 DETERMINE EXSTG SYS/EQ PHYSICAL/FNCTNL CHRCTRSTCS
 27. C7.2    DTIME 1          2       10.0      20.0
 28. C7.2    DCOST 1          2       10.0     100.0
 29. C7.2    DPERF 1          2       10.0      50.0
                +        +        +        +        +        +        +        +
 30. C8.2    N3B      N4B       1.0 DETERMINE EXISTING SYSTEM/EQUIPMENT COSTS
 31. C8.2    DTIME 1          2       10.0      20.0
 32. C8.2    DCOST 1          2       10.0     100.0
 33. C8.2    DPERF 1          2       10.0      50.0
                +        +        +        +        +        +        +        +
 34. C9.2    N4B      N5B       1.0 CONSOLIDATE EXISTING SYSTEM/EQUIPMENT DATA
 35. C9.2    DTIME 1          2       10.0      20.0
 36. C9.2    DCOST 1          2       10.0     100.0
 37. C9.2    DPERF 1          2       10.0      50.0
                +        +        +        +        +        +        +        +
 38. C10.2   N5B      N6B       1.0 SEND COST/RDINSS/SUPPRT'Y DRIVERS TO 303.2.9.5
 39. C10.2   DTIME 1          2       10.0      20.0
 40. C10.2   DCOST 1          2       10.0     100.0
 41. C10.2   DPERF 1          2       10.0      50.0
                +        +        +        +        +        +        +        +
 42. C11.2   N5B      N6B       1.0 SEND SYS/EQ SUPPRT'Y/COST/READINESS DATA >303.2.9.6
 43. C11.2   DTIME 1          2       10.0      20.0
 44. C11.2   DCOST 1          2       10.0     100.0
 45. C11.2   DPERF 1          2       10.0      50.0
                +        +        +        +        +        +        +        +
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                1       2       3       4       5       6       7       8
       12345678901234567890123456789012345678901234567890123456789012345678901234567890
1        N E W    N E T W O R K              PAGE  2
                1       2       3       4       5       6       7       8
       12345678901234567890123456789012345678901234567890123456789012345678901234567890
   46. ENDARC
                +       +       +       +       +       +       +       +
   47. N1B      1  2 0 0
                +       +       +       +       +       +       +       +
   48. N2B      2  2 0 0
                +       +       +       +       +       +       +       +
   49. N3B      2  2 0 0
                +       +       +       +       +       +       +       +
   50. N4B      2  2 0 0
                +       +       +       +       +       +       +       +
   51. N5B      2  2 0 0
                +       +       +       +       +       +       +       +
   52. N6B      2  1 0 0
                +       +       +       +       +       +       +       +
   53. ENDNODE
                1       2       3       4       5       6       7       8
       12345678901234567890123456789012345678901234567890123456789012345678901234567890
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ANNEX E

STRUCTURED SYSTEMS ANALYSIS

Fundamentals

ANNEX E
STRUCTURED SYSTEMS ANALYSIS

Fundamentals

Structured Systems Analysis (SSA) has recently become an industry standard for generating Data Flow Diagrams (replacing "logic diagrams" or "flow charts") to aid in coordinating the functions to be performed by a computer program and its associated Inputs/Outputs (I/O). During the SSA, each set of "flow charts" can be checked by the potential user to assure that there is complete agreement on what is to be done by the program, and how it is to be accomplished. It also provides considerable flexibility for updating or changing the program.

Six basic elements (see figure 1) are used in SSA:

1. Process (PRC)
2. Data Flow (DAF)
3. Data Store (DAS)
4. External Entity (EXT)
5. Data Flow Diagram (DFD)
6. Data Dictionary (DCT)

PROCESS (Represented by a Circle):

A function or operation to be performed which can be explained by a set of instructions representing a single task, e.g., "calculate interest on a loan", "prepare a draft report". If the Process description is too complex to describe in a few steps, it may be necessary to develop a lower level description (see below).

DATA FLOW (Lines interconnecting Processes or I/Os):

Each function or Process cannot be a stand-alone in a complex network. To have any meaning in a program, each process must be initiated by a previous action and/or provided information on which to act. Furthermore, a Process must result in an output which is the input to the next logical Process. These inputs, outputs, or initiating actions are identified as Data Flows, and are represented by the Data Flow lines indicating its point of origin and the process to which it provides data.

DATA STORE (Represented by two parallel lines):

Although some Processes generate data used as input to a succeeding Process, there is often a need to "gather or collect" information from files in which it is stored. This information may come from an external source (such as a MIL-STD, Army regulation, historical experience files, etc.), or an internal source or file in which data is temporarily stored for use by succeeding processes. These Data Stores can be visualized as a "file cabinet", in which the data are stored for later retrieval).

EXTERNAL ENTITY (Represented by a Rectangle):

Each program or logical process must have an initiating action, a "point" of disposition of the results, and possible input guidance or instructions. Each of these have authorities, functions, or applications which are independent of the program Process (although required by the program Process). Thus, these activities, agencies, or facilities are considered "External Entities" to the program.

DATA FLOW DIAGRAM:

The general arrangement of the above can be readily seen. First, the circle or Process describes what has to be done; the interconnecting lines represent the Data Flows, together with the specific description of all I/Os. The Data Stores identify the source and/or file designation of a data base, and the External Entities represent those activities remote from the Process, which are the source of guidance or the recipients of the program. This combination of Processes, Data Flows, Data Stores, and External Entities constitutes a "Data Flow Diagram". The unique feature of the Data Flow Diagram (DFD) is that each process can be considered independently, permitting a change to be made in one Process without a major change in the overall program.

DATA DICTIONARY:

The Data Dictionary consists of a complete description of each of the basic elements. For the Process, it contains a step-by-step description of what has to be performed. The description of the Data Flow identifies the nomenclature of the data, a detailed description of its content, and its source. The Data Stores and External Entities are described, including possible location.

The Data Dictionary (a living document) begins with a description of the first Process and is continually built-up as the Data Flow Diagrams are expanded, detailed, and eventually completed.

APPROACH TO PERFORMING STRUCTURED SYSTEM ANALYSIS:

The best approach to Structured Systems Analysis is to assume that the program consists of a series of processes, each of which are to be assigned to an inexperienced analyst. Each analyst is to be walked through the assigned process of the Program, explaining step-by-step functions have to be performed or what actions have to be taken to accomplish the process. The analyst is also informed where the information is coming from (input Data Flow), what is to be generated by each process (output Data Flow), where the data base may to be found (Data Stores), and who to contact for guidance (External Entities).

The best way to initiate a SSA is to set down the point of origin of a program, its final goal(s), and the intermediate functions or actions needed to get from beginning to goal. Each step should be considered as a Process - some may be sequential and others parallel. Then, the steps needed to accomplish the Process should be described. If the description is complex and needs intermediate steps, the Process is then a candidate for an "explosion". That is, the top (or upper) level Process is considered as a "project" and its own Data Flow Diagram is prepared.

When writing the step-by-step procedures in the Process, certain elements of data (or information) must be made available for the procedure. Each element of data is considered as an input Data Flow, which is identified and described. The product (or result) of a Process is an output Data Flow element.

Each Data Flow to the Process must originate from:

1. an earlier Process
2. a Data Store (or file)
3. an External Entity.

These sources are also identified, described and put into the Data Dictionary. As soon as the last portion of the Data Flow Diagram has been described, the SSA is complete.

The structured Analysis phase is followed by Structured Design, then by programming and finally software test and validation. The organization of Structured Analysis and its relationship to Structured System Design is shown on Figure 2.

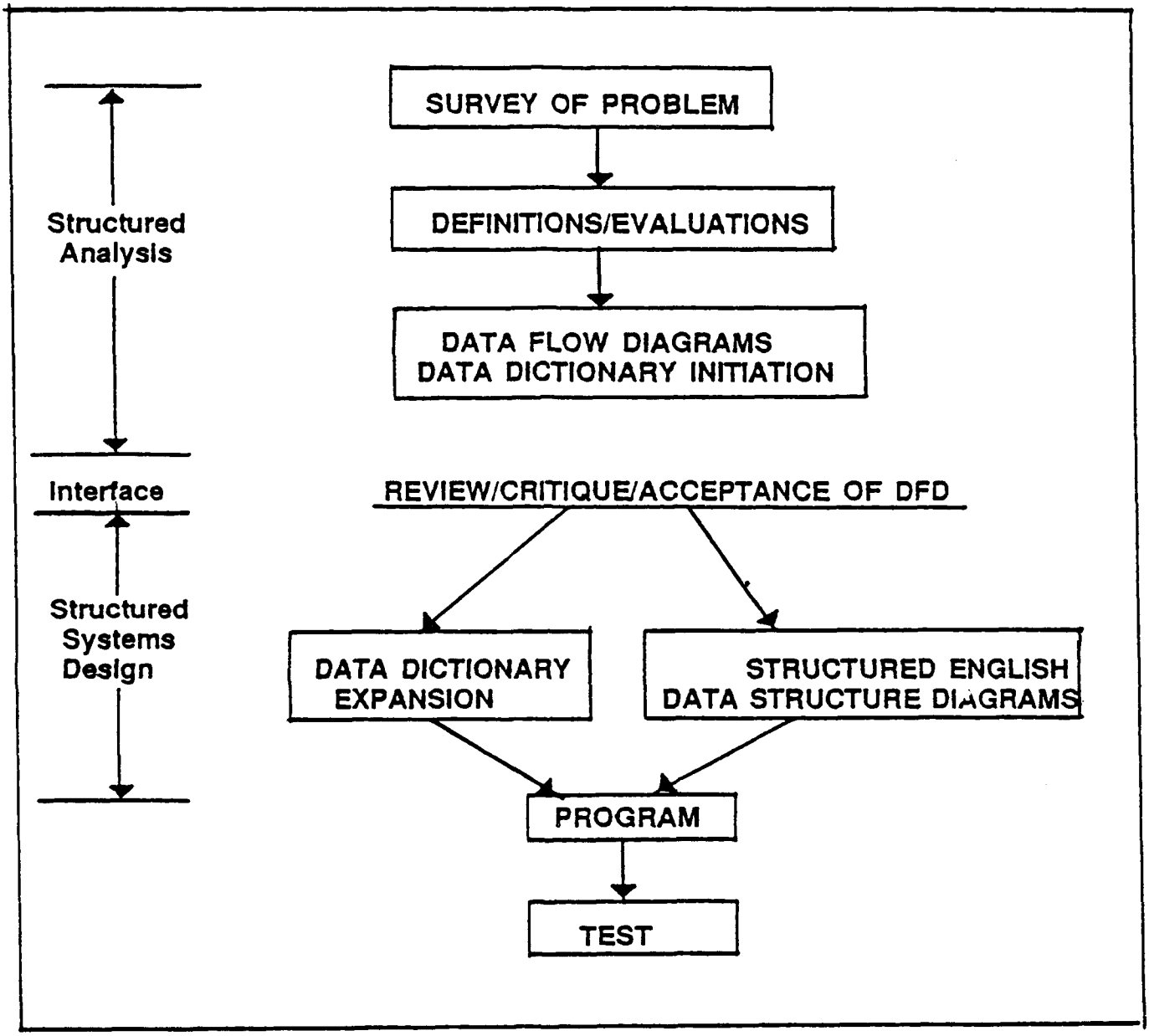

Figure 1. Structured Analysis & Structured Systems Design Organization

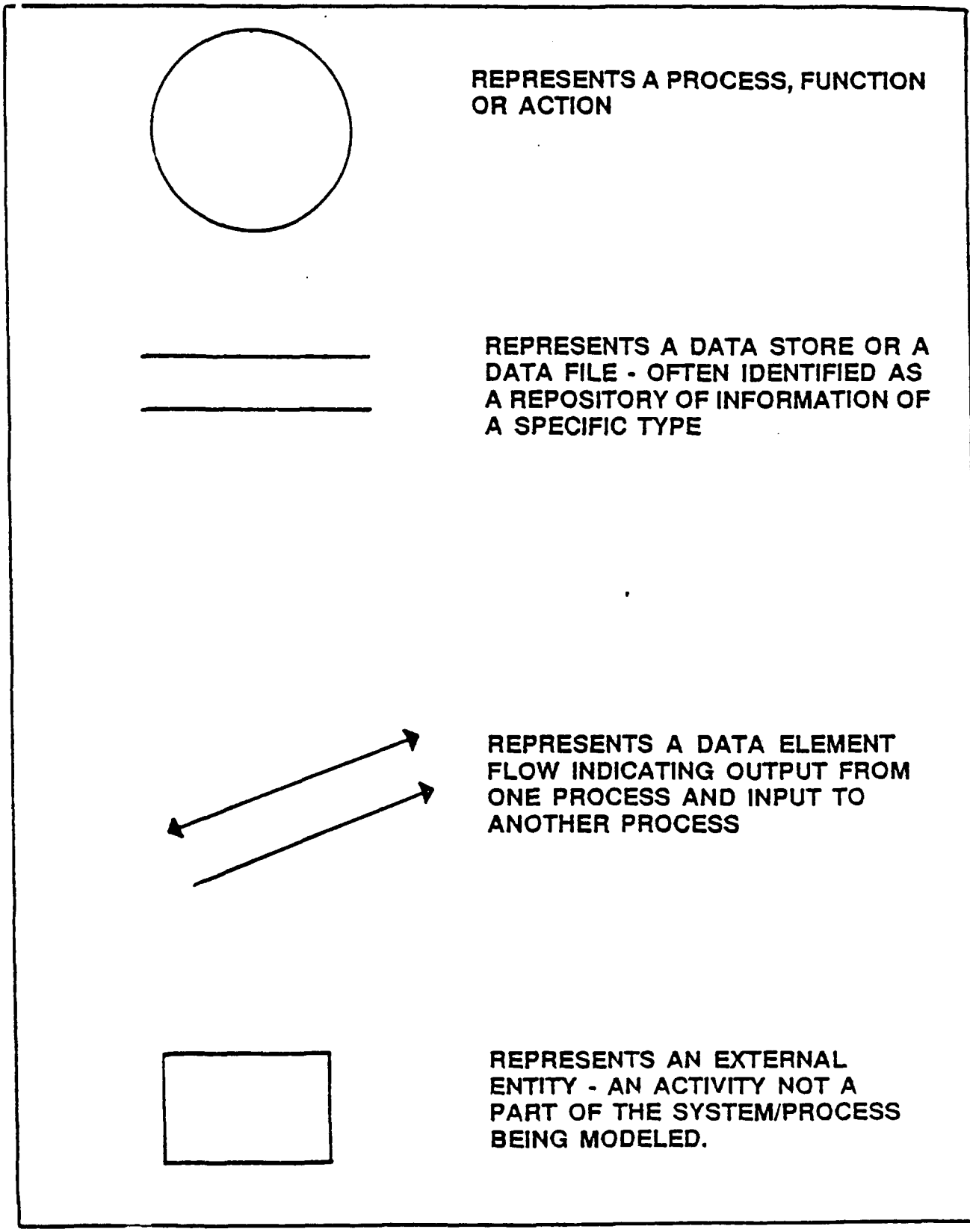

Figure 2. Standard DFD Symbol Definitions